Sri Sathya Sai College for Women, Bhopal

(An Autonomous College affiliated to Barkatullah University, Bhopal)

(NAAC Accredited 'A' Grade)

SYLLABUS
SESSION: 2023-24
PROGRAM: Diploma

YEAR: II Year
CLASS: B.Sc.
SUBJECT: Computer Science

Sri Sathya Sai College for Women, Bhopal
(An Autonomous College Affiliated to Barkatullah University Bhopal)
Department of Higher Education, Govt. of M.P.
Under Graduate Syllabus (Annual Pattern)
As recommended by Central Board of Studies and approved by the Governor of M. P.
wef 2022-2023
(Session 2023-24)
(NEP-2020)

Class	B.Sc.
Year	II Year
Subject	Computer Science
Course Title	Computer Networks & Information Security
Course Type	Core Course (Major I)
Credit Value	4
Max. Mark	30+70 (Minimum Marks 35)

Course Outcome: After the completion of this course, a student shall be able to:

- Define and describe the components of Data Communications System such as various protocols, OSI Model, data transmission in analog and digital format.
- Identify and differentiate among the network devices and drivers.
- Learn and describe various error detection and correction methods. Define the various terminologies used in Network and Application layers.
- Compare the various network technologies and can decide the suitable technology installation as per requirement and environment at any work place.
- Describe the various protocols and can identify the application areas of each protocol.
- Know the fundamentals of network and information security issues, laws, and various security technologies which can be applied on work place.

Particular

Unit 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, Metropolitan 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.
Unit 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;

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	Cellular Network: Common concepts - cells, handoff, paging; 1G, 2G, 3G, 4G & 5G technology.	
Unit 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).	
Unit 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 Circuits 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.	
Unit 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 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, Instruction detection and prevention systems, Scanning and Analysis Tools: Biometric access controls, Cipher methods, Cryptographic algorithms, Cryptographic tools, Protocols for secure communication.	
Unit 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.	

Suggestion Books:
- 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.

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.
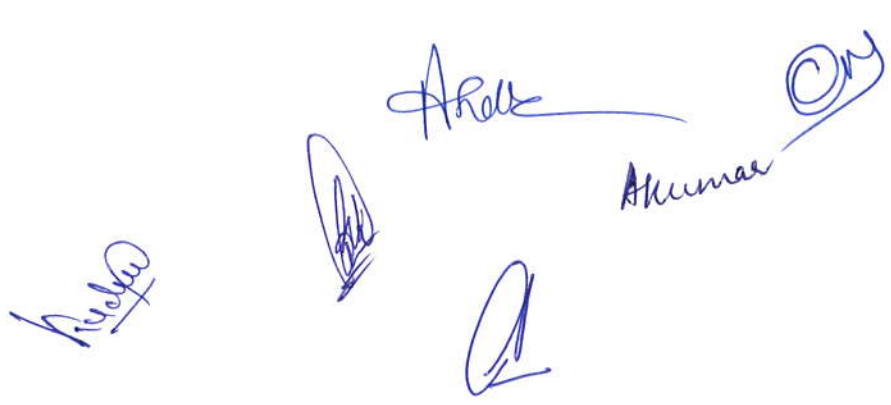
Suggestive digital platform web links
- https://www.youtube.com/watch?v=qiQR5rTSshw
- https://www.youtube.com/watch?v=H8W9oMNSuwo
- https://www.youtube.com/watch?v=t-ai8JzjHuY

Suggested equivalent online courses
- NPTEL course: Demystifying Networking
- NPTEL course: Cyber Security
- https://www.edx.org/learn/computer-networking

Scheme of Marks:

Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 30 marks, Term End Exam Theory: 70 marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE):	Class Test Assignment/ Presentation	30
External Assessment: University Exam Section Time:03.00 Hours	**Section (A)** Very Short questions **Section (B)** Short questions **Section (C)** Long questions	70
		Total 100

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Class	B.Sc.
Year	II Year
Subject	Computer Science
Course Title	Computer Networks Lab
Course Type	Core Course (Major I)
Credit Value	2
Max. Mark	30+70 (Minimum Marks 35)

Course Outcome: After the completion of this course, a student shall be able to:
- Learn and identify various cables used in the networking.
- Learn, identify various connectors used to connect different cables.
- Use the various tools for preparing the connectors for cables.
- Configure and manage various local area networks at home and at work place.

Particular

List of Practicals:

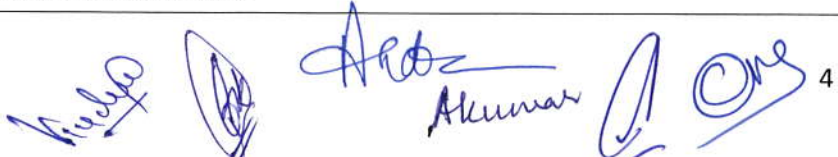1. **Study of UTP network cable**
   - Study the color code of UTP cable
   - Categories of UTP n/w cable
   - Shielding of n/w cable
   - Electricity interference with n/w cable
   - Maximum length for which data cable can be used
   - Crimping of RJ45 connector and Punching of data n/w cable
   - Penta scanning of cabling work
   - Rules of UTP laying

2. **Knowledge of Structured Cabling and its components**
   - Information outlet with box
   - Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U)
   - Patch Panel
   - Rack Management

3. **Study of Optical Fiber cable**
   - Different cores of OFC (6 core, 12, 24 core)
   - Multimode & Single mode OFC cable
   - Shielding of OFC
   - Splicing/Termination of OFC

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- OTDR Testing
- LIU fixing
- LIU management (pigtail/fiber patchcord)
- Media Convertor
- SFP module
- Rules of OFC laying

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

4. **Configuration/ Management of Local Area Network**
- Implementation of file and printer sharing.
- Installation of ftp server and client.
- Connect the computers in local Area Network.
- 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.
- Configure static routing using packet tracer software
- Configure dynamic routing using packet tracer software
- Configure VLAN using Managed switch Device / Packed tracer
- Implementation of Subnetting in Class A, B and C
- Ping between 2 systems using IPv6
- Configuration of NAT for incoming packet request
- Configuration of Software / Hardware firewall to block outgoing requests to facebook.com

Suggestion Books:
- 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.

Reference Books:
- Hacking Exposed, Stuart McClure, Joel Scrambray, George Kurtz, TMH.
- Computer Security Art and Science, Matt Bishop, Pearsor/PHI.

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Suggested Digital Platforms Web links:
https://www.edx.org/learn/computer-networking

Suggested equivalent online courses:
https://nptel.ac.in/courses/106/105/106105081/

Scheme of Marks:

Maximum Marks: 100		
Internal Assessment :	Class Interaction / Quiz Attendance Assignments (Charts / Model Seminar / Rural Service / Technology Dissemination / Report of Excursion / Lab Visits / Survey / Industrial visit)	30
External Assessment:	Viva Voce on Practical Practical Record File Table Work / Experiments	70
		Total 100