

**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)**

<b>Class</b>	<b>BCA</b>
<b>Year</b>	<b>II Year</b>
<b>Subject</b>	<b>Computer Applications</b>
<b>Course Title</b>	<b>Data Communication and Computer Networks</b>
<b>Course Type</b>	<b>Core Course (Major I)</b>
<b>Credit Value</b>	<b>4</b>
<b>Max. Mark</b>	<b>30+70 (Minimum Marks 35)</b>

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

- Demonstrate the Basic Concepts of Networking, Networking Principles, Routing Algorithms, IP Addressing and Working of Networking Devices.
- Demonstrate the Significance, Purpose and application of Networking protocols and Standards.
- Describe, compare and contrast LAN, WAN, MAN, Intranet, Internet, AM, FM, PM and Various Switching Techniques.
- Explain the working of Layers and apply the various protocols of OSI & TCP/IP model.
- Analyze the Requirements for a Given Organizational Structure and Select the Most Appropriate Networking Architecture and Technologies.
- Design the Network Diagram and Solve the Networking Problems of the Organizations with Consideration of Human and Environment. Install and Configure the Networking Devices.

**Particular**

<b>Unit I</b>	Network goals and application, Network structure, Network services, Example of networks and Network Standardization, Networking models: centralized, distributed and collaborative. Network Topologies: Bus, Star, Ring, Tree, Hybrid: Selection and Evaluation factors.
<b>Unit II</b>	Theoretical Basis for Data communication, Transmission media, Twisted pair (UTP, STP), Coaxial Cable, Fiberoptics: Selection and Evaluation factors. Line of Sight Transmission, Communication Satellites, Analog and Digital transmission, Transmission and switching, frequency division and time division multiplexing, STDM, Circuit switching, packet switching and message switching.
<b>Unit III</b>	Brief Overview of LAN (Local Area Network): Classification. Brief overview of Wide Area Network (WAN), Salient features and differences of LAN with emphasis on: Media, Topology, Speed of Transmission, Distance, Cost. Terminal Handling, Polling, Token passing, Contention. IEEE Standards: their need and developments.
<b>Unit IV</b>	Open System: What is an Open System? Network Architectures, ISO-OSI Reference Model, Layers: Application, Presentation, Session, Transport, Network, Data Link & Physical. Physical Layer – Transmission, Bandwidth, Signaling devices used, media type. Data Link Layer: Addressing, Media Access Methods, Logical link Control, Basic algorithms/ protocols.

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<b>Unit V</b>	Network Layer: Routing Fewest- Hops routing, Type of Service routing, Updating Gateway routing information. Brief overview of Gateways, Bridges and Routers, Gateway protocols, routing daemons. OSI and TCP/IP model. TCP/IP and Ethernet. The Internet: The structure of the Internet, the internet layers. Internetwork problems, Internet Standards.
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**Suggestion Books:**

- Tanenbaum, A.S. : Computer Networks, Prentice Hall, 1985 Processing, Prentice Hall, 1983.
- Black: Computer Networks: Protocols, Standards and Interfaces, Prentice Hall International
- Fourauzan B. “Data Communications and Networking”, 3<sup>rd</sup> edition, TataMcGrawHill Publications.

**Reference Books:**

- Comer D., “Computer Networks and Internet”, 2nd Edition, Pearson Education
- S.K. Basandra & S. Jaiswal, “Local Area Networks’, Galgotia Publications
- William Stallings, “Data and Computer Communication”

**Suggestive digital platform web links**

- <https://www.nptel.ac.in/courses/106/105/106105082/>
- [https://cse.iitkgp.ac.in/~sandipc/courses/cs31006/slides/application\\_layer.pdf](https://cse.iitkgp.ac.in/~sandipc/courses/cs31006/slides/application_layer.pdf)

**Scheme of Marks:**

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



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<b>Year</b>	<b>II Year</b>
<b>Subject</b>	<b>Computer Applications</b>
<b>Course Title</b>	<b>Computer Networks Lab</b>
<b>Course Type</b>	<b>Core Course (Major I)</b>
<b>Credit Value</b>	<b>2</b>
<b>Max. Mark</b>	<b>30+70 (Minimum Marks 35)</b>
<b>Course Outcome: After the completion of this course, a student shall be able to do the following:</b>	
<ul style="list-style-type: none"> <li>• Learn and identify various cables used in the networking.</li> <li>• Learn, identify various connectors used to connect different cables.</li> <li>• Use the various tools for preparing the connectors for cables.</li> <li>• Configure and manage various local area networks at home and at work place.</li> </ul>	

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

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### 3. Use of tools

- Crimping Tool
- Punching Tool
- Nose plier
- Wire Stripping and Cable Cutter
- Multimeter
- RJ45 RJ11 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
- 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, Neck Feamster, David J. Wetherall, Computer Networks, 6<sup>th</sup> Edition, (2021), Pearson.
- Michael E Whiteman and Herbert J Mattord, Principles of Information Security, Fourth Edition, CENGAGE Learning, 6<sup>th</sup> Indian Reprint.

### Reference Books:

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

### Suggestive digital platform web links

- <https://www.edx.org/learn/computer-networking>
- <https://www.mphindigranthacademy.org/>

### Suggestive equivalent online courses

- <https://www.nptel.ac.in/courses/106/105/106105081/>

**Scheme of Marks:**

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

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