

## A. Course Handout (Version 1.1)

Institute/School Name	Chitkara University Institute of Engineering and Technology		
Department Name	Department of Computer Science & Engineering		
Programme Name	Bachelor of Engineering (B.E.), Computer Science & Engineering		
Course Name	Computer Networks	Session	2024-2025
Course Code	22CS008	Semester/Batch	3 <sup>rd</sup> /2023
L-T-P (Per Week)	3-0-2	Course Credits	04
Course Coordinator	Dr. Amanpreet Kaur		

<b>CLO01</b>	Define the hardware, software, components of a network and the interrelations.
<b>CLO02</b>	Explain the role of reference models and the hierarchical relationship of their respective layers.
<b>CLO03</b>	Classify the networking protocols and select the appropriate protocol for a particular design.
<b>CLO04</b>	Examine the concepts and theories of networking with the real-world scenarios.
<b>CLO05</b>	Design an enterprise network including topologies, protocols, management, and security.

### 1. Objectives of the Course

The scope of the course is to provides the foundation for understanding the key aspects of computer network organization and implementation obtaining a theoretical understanding of data communication and computer networks. Students will be introduced to computer communication, network design and its operations will be ready for Industry Certifications such as CCNA, CCNP etc. The objectives of the course are:

- to build an understanding of the fundamental concepts of computer networking.
- to inculcate the skill in students to construct and debug computer networks.
- to develop, implement and manage computer networking systems within an organization.
- to familiarize with current topics such as network management, security and/or other topics.

### 2. Course Learning Outcomes

After completion of the course, student should be able to:

	Course Learning Outcome	*POs	**CL	***KC	Sessions
<b>CLO01</b>	Define the hardware, software, components of a network and the interrelations.	PO1, PO2, PO3, PO5, PO12	K2	Factual Conceptual	<b>12</b>
<b>CLO02</b>	Explain the role of reference models and the hierarchical relationship of their respective layers	PO1, PO3, PO4, PO5	K3	Conceptual Procedural	<b>12</b>
<b>CLO03</b>	Classify the networking protocols and select the appropriate protocol for a particular design.	PO1, PO2, PO3, PO4, PO5, PO7, PO11	K3	Conceptual Procedural	<b>12</b>

<b>CLO04</b>	Examine the concepts and theories of networking with the real-world scenarios.	PO3, PO4, PO5	K4	Procedural	<b>10</b>
<b>CLO05</b>	Design an enterprise network including topologies, protocols, management and security.	PO4, PO5	K3	Conceptual Procedural	<b>12</b>
<b>Total Contact Hours</b>					<b>58</b>

Revised Bloom's Taxonomy Terminology

\* PO's available at ([shorturl.at/cryzF](http://shorturl.at/cryzF))

\*\*Cognitive Level =CL

\*\*\*Knowledge Categories = KC

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO01		H		H		M						H
CLO02	H	H	H	M	M	M					H	H
CLO03	H	M		H	M	M					M	M
CLO04	H	H		H		H						
CLO05	H	H	H		M	M	M				M	H

H=High, M=Medium, L=Low

### 3. ERISE Grid Mapping

Feature Enablement	Level (1-5, 5 being highest)
Entrepreneurship	1
Research	3
Innovation	2
Skills	5
Employability	4

### 4. Recommended Books:

#### Text Books:

**B01:** Data Communications and Networking' by Forouzan, 5<sup>th</sup> Edition, 2013.

**B02:** Computer Networks' By Andrew S. Tanenbaum 5<sup>th</sup> Edition, Pearson Education,2013.

**B03:** Data and Computer Communications' by William Stallings, 8<sup>th</sup> Edition, Pearson,2007.

**B04:** CCNA Cisco Certified Network Associate Study Guide', by Todd Lammle, Wiley, 7<sup>th</sup> Edition,2011.

**B05:** Security Engineering: A Guide to Building Dependable Distributed Systems, 2nd Edition by Ross J. Anderson

#### Reference Books:

**B05:** Computer Networking: A Top-Down Approach', by Kurose and Ross, Pearson Education, 6<sup>th</sup> Edition, 2013.

**E-Resources:**

- <https://library.chitkara.edu.in/subscribed-books.php>

**5. Other readings and relevant websites:**

Serial No	Link of Journals, Magazines, websites and Research Papers
1.	<a href="https://nptel.ac.in/courses/106105183">https://nptel.ac.in/courses/106105183</a>
2.	<a href="https://nptel.ac.in/courses/106106091">https://nptel.ac.in/courses/106106091</a>
3.	<a href="https://nptel.ac.in/courses/106105081">https://nptel.ac.in/courses/106105081</a>
4.	<a href="http://www.brainbell.com/tutorials/Networking/">http://www.brainbell.com/tutorials/Networking/</a>
5.	<a href="https://learningnetwork.cisco.com/index.jspa?ciscoHome=true">https://learningnetwork.cisco.com/index.jspa?ciscoHome=true</a>
6.	<a href="http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-263j-data-communication-networks-fall-2002/lecture-notes/">http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-263j-data-communication-networks-fall-2002/lecture-notes/</a>

**6. Recommended Tools and Platforms**

Cisco Packet Tracer-7.3 or above versions, GNS3

**7. Course Plan:**

Lecture Number	Topics	Text Book
1	<b>Detail Discussion of Course Handout (CHO)</b>	B01-Chpater-1
2-3	<b>Introduction:</b> Uses of Computer Networks, Network Hardware Topologies, Collision Domain, Broadcast Domain	B01-Chapter-1
4-5	<b>Reference Models:</b> Seven-Layer OSI architecture, Concepts of Layers, Protocols and Layer interfaces and PDU, TCP/IP Reference Model, Comparison of OSI and TCP/IP reference models	B01-Chapter-2
6-7	<b>Physical Layer:</b> Transmission Media (Cable Media), Wireless Media (Cellular Telephone, Satellite Networks) Types of Connecting Devices (Hubs, Switches, Routers)	B01-Chapter-7
8-9	<b>Ethernet Frames,</b> Ethernet and the OSI Model, Ethernet Frame Fields, Ethernet MAC Address, Frame Processing, Multicast MAC Address, Broadcast MAC Address, Unicast MAC Address, ARP and RARP	B01-Chapter-13 B01-Chapter-13
10-11	<b>Network Security:</b> Security Services, Security Threats, and Vulnerabilities, Network Attacks: Types of Malwares, Reconnaissance Attacks, Access Attacks, Denial of Service Attacks	B01-Chapter-30 B01-Chapter-31 B05-Chapter-21
12-13	<b>Network Attack Mitigations:</b> The Défense-in-Depth Approach Keep Backups, Firewalls, Types of Firewalls, Authentication, Authorization, and Accounting	B05-Chapter-21
14-15	<b>VLAN concept,</b> Configuration, Trunks, Trunking Protocol, WLAN concepts, Configuration, Wireless Network	B01-Chapter-15 B04-Chapter-1
16-17	<b>Network Layer:</b> Concept of IP packet and addresses, IPv4 protocol format, Routing Algorithm-Distance Vector Routing, Link State Routing	B01-Chapter-19
18-19	ICMP, IGMP, IPV6, Transition from IPv4 to IPv6(format)	B01-Chapter-20
20-21	Network Classes (A, B, C, D) and Subnetting, Troubleshooting	B01-Chapter-21

22-23	<b>Static and Dynamic routing algorithms:</b> Shortest Path Routing, Routing Protocols (Static and Dynamic)	B01-Chapter-22
24-25	<b>Routing Protocols:</b> OSPF, EIGRP, Introduction to BGP, Routing Information Protocol (v1 & v2)	B01-Chapter-22
26-27	<b>Data Link Layer:</b> Types of Errors, Redundancy, Error Detection and Correction, CRC, Check Sum, Hamming code & Distance	B01-Chapter-10 B01-Chapter-11
28-29	<b>Multiple Access Protocols:</b> - <b>Random Access Protocols</b> –ALOHA, CSMA, CSMA/CA, CSMA/CD	B01-Chapter-11 B01-Chapter-12
30-31	<b>Channelization Protocols:</b> FDMA, TDMA, CDMA, <b>Controlled Access Protocols:</b> Reservation, Polling, Token Passing, Piggybacking	B01-Chapter-11
32-33	<b>Noisy Channel:</b> Stop and Wait, Automatic Repeat Request, go-back-n, selective repeat	B01-Chapter-12
34-35	<b>Noiseless Channels:</b> Elementary data link protocols, Simplex, Stop and Wait Protocol, <b>Transport layer:</b> Services, Connection Less and Connection Oriented protocol	B01-Chapter-11 B01-Chapter-23
<b>ST-1 Syllabus (Lecture number 2-30)</b>		
36-37	Transport Layer Protocols, TCP Connection, Transmission Control Protocol with Three-Way Handshaking, TCP / UDP Message Format, Congestion Control and Quality of Service	B01-Chapter-23
38-40	<b>Application Layer:</b> Domain Name System, Remote Logging, Electronic Mail, Introduction to FTP and WWW, Introduction to HTTP, SMTP and SNMP	B01-Chapter-25
<b>ETE (Syllabus = Lecture number 1-40)</b>		

## 8. Delivery/Instructional Resources

Lecture Number	Topics		Text Book
1	<b>Detail Discussion of Course Handout (CHO)</b>		
2-3	<b>Introduction:</b> Uses of Computer Networks, Network Hardware Topologies, Collision Domain, Broadcast Domain	<a href="https://www.cisco.com/c/en/us/solutions/automation/net-work-topology.html">https://www.cisco.com/c/en/us/solutions/automation/net-work-topology.html</a>	<a href="https://www.youtube.com/watch?v=uDulBxDB7GM">https://www.youtube.com/watch?v=uDulBxDB7GM</a>
4-5	<b>Reference Models:</b> Seven-Layer OSI architecture, Concepts of Layers, Protocols and Layer interfaces and PDU, TCP/IP Reference Model, Comparison of OSI and TCP/IP reference models	<a href="http://www.ics.uci.edu/%7Emagda/Courses/netsys270/ch2_v1.ppt">http://www.ics.uci.edu/%7Emagda/Courses/netsys270/ch2_v1.ppt</a> <a href="https://slideplayer.com/slide/254123/">https://slideplayer.com/slide/254123/</a> <a href="https://www.slideshare.net/ankurkumar983/tcp-ip-model">https://www.slideshare.net/ankurkumar983/tcp-ip-model</a>	<a href="https://www.youtube.com/watch?v=vv4y_uOn_eC0">https://www.youtube.com/watch?v=vv4y_uOn_eC0</a> <a href="https://www.youtube.com/watch?v=2QGgEk20RXM">https://www.youtube.com/watch?v=2QGgEk20RXM</a>
6-7	<b>Physical Layer:</b> Transmission Media (Cable Media), Wireless Media (Cellular Telephone, Satellite Networks) Types of Connecting Devices (Hubs, Switches, Routers)	<a href="http://www.ics.uci.edu/%7Emagda/Courses/netsys270/ch1_v1.ppt">http://www.ics.uci.edu/%7Emagda/Courses/netsys270/ch1_v1.ppt</a>	<a href="https://www.youtube.com/watch?v=BJ7f-HcttyE">https://www.youtube.com/watch?v=BJ7f-HcttyE</a> <a href="https://www.youtube.com/watch?v=8ONuDQF7gOY">https://www.youtube.com/watch?v=8ONuDQF7gOY</a>

8-9	<b>Ethernet Frames,</b> Ethernet and the OSI Model, Ethernet Frame Fields, Ethernet MAC Address, Frame Processing, Multicast MAC Address, Broadcast MAC Address, Unicast MAC Address, ARP and RARP	<a href="https://www.geeksforgeeks.org/ethernet-frame-format/">https://www.geeksforgeeks.org/ethernet-frame-format/</a> <a href="https://www.javatpoint.com/ethernet-frame-format">https://www.javatpoint.com/ethernet-frame-format</a>  <a href="https://help.stonesoft.com/onlinehelp/StoneGate/SMC/6.5.0/GUID-74D81A6F-9EE0-433E-904F-5BC4722B1202.html#:~:text=I n%20Ethernet%20(as%20defined%20in,%3Afe%3Afe%20are%20not.">https://help.stonesoft.com/onlinehelp/StoneGate/SMC/6.5.0/GUID-74D81A6F-9EE0-433E-904F-5BC4722B1202.html#:~:text=I n%20Ethernet%20(as%20defined%20in,%3Afe%3Afe%20are%20not.</a> <a href="https://networklessons.com/multicast/multicast-ip-address-to-mac-address-mapping">https://networklessons.com/multicast/multicast-ip-address-to-mac-address-mapping</a>	<a href="https://www.youtube.com/watch?v=ewpq3qxx5Ls">https://www.youtube.com/watch?v=ewpq3qxx5Ls</a> <a href="https://www.youtube.com/watch?v=GK_uF6cvrOY">https://www.youtube.com/watch?v=GK_uF6cvrOY</a> <a href="https://www.youtube.com/watch?v=TliQiw7fpsU">https://www.youtube.com/watch?v=TliQiw7fpsU</a> <a href="https://www.youtube.com/watch?v=q2U7Rg9KNG8">https://www.youtube.com/watch?v=q2U7Rg9KNG8</a> <a href="https://www.youtube.com/watch?v=IUSyV2BVh4A">https://www.youtube.com/watch?v=IUSyV2BVh4A</a> <a href="https://www.youtube.com/watch?v=3YcKrtVo2Ro">https://www.youtube.com/watch?v=3YcKrtVo2Ro</a>
10-11	<b>Network Security:</b> Security Services, Security Threats, and Vulnerabilities, Network Attacks: Types of Malwares, Reconnaissance Attacks, Access Attacks, Denial of Service Attacks	<a href="https://www.slideshare.net/gichelleamon/network-security-12322065">https://www.slideshare.net/gichelleamon/network-security-12322065</a>  <a href="https://www.scaler.com/topics/computer-network/cryptography-and-network-security/">https://www.scaler.com/topics/computer-network/cryptography-and-network-security/</a>	<a href="https://www.youtube.com/watch?v=1pIMO7ChXMu&amp;list=PLJ5C_6qdAvBFAuGoLC2wFGruY_E2gYtev">https://www.youtube.com/watch?v=1pIMO7ChXMu&amp;list=PLJ5C_6qdAvBFAuGoLC2wFGruY_E2gYtev</a>  <a href="https://www.youtube.com/watch?v=yUel4nqvNs8">https://www.youtube.com/watch?v=yUel4nqvNs8</a>
12-13	<b>Network Attack Mitigations:</b> The Défense-in-Depth Approach Keep Backups, Firewalls, Types of Firewalls, Authentication, Authorization, and Accounting	<a href="https://www.cl.cam.ac.uk/~rja14/Papers/SEv2-c21.pdf">https://www.cl.cam.ac.uk/~rja14/Papers/SEv2-c21.pdf</a>	<a href="https://www.youtube.com/watch?v=o_vyfo3Hw0Y">https://www.youtube.com/watch?v=o_vyfo3Hw0Y</a>
14-15	<b>VLAN concept,</b> Configuration, Trunks, Trunking Protocol, WLAN concepts, Configuration, Wireless Network	<a href="https://www.geeksforgeeks.org/virtual-lan-vlan/">https://www.geeksforgeeks.org/virtual-lan-vlan/</a>  <a href="https://www.cisco.com/c/en/us/products/wireless/wireless-lan.html#:~:text=A%20wireless%20local%2Darea%20network,webpage%20is%20using%20a%20WLAN.">https://www.cisco.com/c/en/us/products/wireless/wireless-lan.html#:~:text=A%20wireless%20local%2Darea%20network,webpage%20is%20using%20a%20WLAN.</a>	<a href="https://www.youtube.com/watch?v=ez24W5oTU3U">https://www.youtube.com/watch?v=ez24W5oTU3U</a> <a href="https://www.youtube.com/watch?v=RBc7MyE9RTQ">https://www.youtube.com/watch?v=RBc7MyE9RTQ</a>
16-17	<b>Network Layer:</b> Concept of IP packet and addresses, IPv4 protocol format, Routing Algorithm-Distance Vector Routing, Link State Routing	<a href="https://www.baeldung.com/cs/ipv4-datagram">https://www.baeldung.com/cs/ipv4-datagram</a>  <a href="https://slideplayer.com/slide/4905255/">https://slideplayer.com/slide/4905255/</a>	<a href="https://www.youtube.com/watch?v=STJhn9gKF2g">https://www.youtube.com/watch?v=STJhn9gKF2g</a> <a href="https://www.youtube.com/watch?v=5ZuP5qjbKSI">https://www.youtube.com/watch?v=5ZuP5qjbKSI</a>
18-19	ICMP, IGMP, IPV6, Transition from IPv4 to IPv6(format)	<a href="https://www.slideshare.net/asimnawaz54/internet-control-message-protocol">https://www.slideshare.net/asimnawaz54/internet-control-message-protocol</a>	<a href="https://www.youtube.com/watch?v=xTqtm7-k25o">https://www.youtube.com/watch?v=xTqtm7-k25o</a>

		<a href="https://www.slideshare.net/atish486/ipv6-17005017">https://www.slideshare.net/atish486/ipv6-17005017</a> <a href="https://www.slideshare.net/raghavendrahamilpure/igmp-35557007">https://www.slideshare.net/raghavendrahamilpure/igmp-35557007</a>	<a href="https://www.youtube.com/watch?v=eBHWkyWgVaM">https://www.youtube.com/watch?v=eBHWkyWgVaM</a> <a href="https://www.youtube.com/watch?v=aor29pGhFE">https://www.youtube.com/watch?v=aor29pGhFE</a>
20-21	Network Classes (A, B, C, D) and Subnetting, Troubleshooting	<a href="https://www.slideshare.net/adkpcte/ip-address">https://www.slideshare.net/adkpcte/ip-address</a> <a href="https://www.slideshare.net/gichelleamon/subnetting-12046383">https://www.slideshare.net/gichelleamon/subnetting-12046383</a>	<a href="https://www.youtube.com/watch?v=0qRcYFGK60&amp;t=1134s">https://www.youtube.com/watch?v=0qRcYFGK60&amp;t=1134s</a> <a href="https://www.indiabix.com/networking/subnetting/">https://www.indiabix.com/networking/subnetting/</a>
22-23	<b>Static and Dynamic routing algorithms:</b> Shortest Path Routing, Routing Protocols (Static and Dynamic)	<a href="https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/iproute_rip/configuration/15-mt/irr-15-mt-book/irr-cfg-info-prot.html">https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/iproute_rip/configuration/15-mt/irr-15-mt-book/irr-cfg-info-prot.html</a>	<a href="https://www.youtube.com/watch?v=NdjcgVreDDU">https://www.youtube.com/watch?v=NdjcgVreDDU</a>
24-25	<b>Routing Protocols:</b> OSPF, EIGRP, Introduction to BGP, Routing Information Protocol (v1 & v2)	<a href="https://www.slideshare.net/escrimag/ospfppt-35277878">https://www.slideshare.net/escrimag/ospfppt-35277878</a> <a href="https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/iproute_rip/configuration/15-mt/irr-15-mt-book/irr-cfg-info-prot.html">https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/iproute_rip/configuration/15-mt/irr-15-mt-book/irr-cfg-info-prot.html</a>	<a href="https://www.youtube.com/watch?v=Zsf9f26rH8U">https://www.youtube.com/watch?v=Zsf9f26rH8U</a> <a href="https://www.youtube.com/watch?v=NdjcgVreDDU">https://www.youtube.com/watch?v=NdjcgVreDDU</a> <a href="https://www.youtube.com/watch?v=Z29ZzKeZHc">https://www.youtube.com/watch?v=Z29ZzKeZHc</a>
26-27	<b>Data Link Layer:</b> Types of Errors, Redundancy, Error Detection and Correction, CRC, Check Sum, Hamming code & Distance	<a href="http://www.engppt.com/2009/12/networking-fourzan-ppt-slides.html">http://www.engppt.com/2009/12/networking-fourzan-ppt-slides.html</a>	<a href="https://www.youtube.com/watch?v=eQgRDdB5Oos">https://www.youtube.com/watch?v=eQgRDdB5Oos</a>
28-29	<b>Multiple Access Protocols:</b> - Random Access Protocols-ALOHA, CSMA, CSMA/CA, CSMA/CD	<a href="https://www.slideshare.net/amogha7/random-access-protocol-in-communication-251294924">https://www.slideshare.net/amogha7/random-access-protocol-in-communication-251294924</a>	<a href="https://www.youtube.com/watch?v=YAjfUc7Tt24">https://www.youtube.com/watch?v=YAjfUc7Tt24</a>
30-31	<b>Channelization Protocols:</b> FDMA, TDMA, CDMA, <b>Controlled Access Protocols:</b> Reservation, Polling, Token Passing, Piggybacking	<a href="https://www.slideshare.net/SammarKhan2/fdmatdmacdma">https://www.slideshare.net/SammarKhan2/fdmatdmacdma</a>	<a href="https://www.youtube.com/watch?v=KviHyRss-dE">https://www.youtube.com/watch?v=KviHyRss-dE</a>
32-33	<b>Noisy Channel:</b> Stop and Wait, Automatic Repeat Request, go-back-n, selective repeat	<a href="https://www.slideshare.net/Vishal061/unit-2-data-link-control">https://www.slideshare.net/Vishal061/unit-2-data-link-control</a>	<a href="https://www.youtube.com/watch?v=YdkksvhkQGQ">https://www.youtube.com/watch?v=YdkksvhkQGQ</a>
34-35	<b>Noiseless Channels:</b> Elementary data link protocols, Simplex, Stop and Wait Protocol, <b>Transport layer:</b> Services, Connection Less and Connection Oriented protocol	<a href="https://www.geeksforgeeks.org/noiseless-channel-protocol/">https://www.geeksforgeeks.org/noiseless-channel-protocol/</a> <a href="https://www.slideshare.net/ahdkhalid/tcp-and-udp">https://www.slideshare.net/ahdkhalid/tcp-and-udp</a>	<a href="https://www.youtube.com/watch?v=n09DfvemnTQ">https://www.youtube.com/watch?v=n09DfvemnTQ</a> <a href="https://www.youtube.com/watch?v=MMDhvhYAF7E">https://www.youtube.com/watch?v=MMDhvhYAF7E</a>
<b>ST-1 Syllabus (Lecture number 2-30)</b>			

36-37	Transport Layer Protocols, TCP Connection, Transmission Control Protocol with Three-Way Handshaking, TCP / UDP Message Format, Congestion Control and Quality of Service	<a href="https://www.slideshare.net/AlokTripathi40/tcpip-3way-handshake">https://www.slideshare.net/AlokTripathi40/tcpip-3way-handshake</a> <a href="https://www.slideshare.net/tmavroidis/tcpudpicmpandthe-transportlayer?qid=d2cf871d-baca-48bf-a3d8-bd1381325b54&amp;v=&amp;b=&amp;from_search=14">https://www.slideshare.net/tmavroidis/tcpudpicmpandthe-transportlayer?qid=d2cf871d-baca-48bf-a3d8-bd1381325b54&amp;v=&amp;b=&amp;from_search=14</a> <a href="https://www.slideshare.net/amanJaiswal32/congestion-control-68607381">https://www.slideshare.net/amanJaiswal32/congestion-control-68607381</a>	<a href="https://www.youtube.com/watch?v=LyDqA-dAPW4">https://www.youtube.com/watch?v=LyDqA-dAPW4</a> <a href="https://www.youtube.com/watch?v=uwoD5YsGACg">https://www.youtube.com/watch?v=uwoD5YsGACg</a>
38-40	<b>Application Layer:</b> Domain Name System, Remote Logging, Electronic Mail, Introduction to FTP and WWW, Introduction to HTTP, SMTP and SNMP	<a href="https://www.slideshare.net/siddiqueibrahim37/domain-name-system-29792343">https://www.slideshare.net/siddiqueibrahim37/domain-name-system-29792343</a> <a href="https://www.slideshare.net/BirminghamPublicLibrary/basic-email">https://www.slideshare.net/BirminghamPublicLibrary/basic-email</a> <a href="https://www.slideshare.net/vinhnguyen509/file-transfer-protocol-36928060">https://www.slideshare.net/vinhnguyen509/file-transfer-protocol-36928060</a> <a href="https://www.slideshare.net/hetaljadav/snmp-26639208">https://www.slideshare.net/hetaljadav/snmp-26639208</a> <a href="https://www.slideshare.net/ToushikPaul/httpprotocol">https://www.slideshare.net/ToushikPaul/httpprotocol</a>	<a href="https://www.youtube.com/watch?v=JkEYOt08-rU">https://www.youtube.com/watch?v=JkEYOt08-rU</a> <a href="https://www.youtube.com/watch?v=pnoWCK82apU">https://www.youtube.com/watch?v=pnoWCK82apU</a> <a href="https://www.youtube.com/watch?v=GeDhsBRigro">https://www.youtube.com/watch?v=GeDhsBRigro</a> <a href="https://www.youtube.com/watch?v=pnoWCK82apU">https://www.youtube.com/watch?v=pnoWCK82apU</a>
ETE (Syllabus = Lecture number 1-40)			

## 9. Lab Plan

Sr. No.	Lab Number	Experiments	Learning Resource
1	1-2	Introduction of Cables, Network devices: Hub, Switches, Router etc. Installation and Introduction to Packet Tracer	<a href="https://www.tutorialspoint.com/network-devices-hub-repeater-bridge-switch-router-gateways-and-brouter">https://www.tutorialspoint.com/network-devices-hub-repeater-bridge-switch-router-gateways-and-brouter</a> <a href="https://www.netacad.com/courses/packet-tracer">https://www.netacad.com/courses/packet-tracer</a>
2	3-4	Simulation of Network Devices (HUB, Switches, Router) and connect more than two computers using Switch to Topologies like Star, Mesh, Ring, BUS, Hybrid etc...	<a href="https://www.geeksforgeeks.org/implementing-star-topology-using-cisco-packet-tracer/">https://www.geeksforgeeks.org/implementing-star-topology-using-cisco-packet-tracer/</a>
3	5-6	Basic commands of Routers: hostname, password, Show Run, Show IP int brief, Assigning IP addresses to interfaces	<a href="https://www.cisco.com/c/en/us/td/docs/routers/access/800M/software/800MSCG/routconf.html">https://www.cisco.com/c/en/us/td/docs/routers/access/800M/software/800MSCG/routconf.html</a>
4	7-8	To do peer to peer connectivity, assign the IP address and share the resources	<a href="https://crocodiletime.com/en/configuration-of-peer-to-peer-network/">https://crocodiletime.com/en/configuration-of-peer-to-peer-network/</a>



5	9-10	Subnetting with Class A, B, C with different IP addresses	<a href="https://t4tutorials.com/ip-subnetting-techniques-and-class-a-b-c-d-and-e/">https://t4tutorials.com/ip-subnetting-techniques-and-class-a-b-c-d-and-e/</a>
6	11-12	Subnetting of Class A, B and C using FLSM and VLSM	<a href="https://www.techtarget.com/searchnetworking/definition/fixed-length-subnet-mask">https://www.techtarget.com/searchnetworking/definition/fixed-length-subnet-mask</a> <a href="https://www.geeksforgeeks.org/introduction-of-variable-length-subnet-mask-vlsm/">https://www.geeksforgeeks.org/introduction-of-variable-length-subnet-mask-vlsm/</a>
7	13-14	To Perform Static Routing, Default Routing by using 2 and 3 routers	<a href="https://www.geeksforgeeks.org/implementation-of-static-routing-in-cisco-2-router-connections/">https://www.geeksforgeeks.org/implementation-of-static-routing-in-cisco-2-router-connections/</a>
8	15-16	To Perform Dynamic Routing using RIP (RIP-V1 and RIP-V2)	<a href="https://www.geeksforgeeks.org/routing-interface-protocol-rip-v1-v2/">https://www.geeksforgeeks.org/routing-interface-protocol-rip-v1-v2/</a>
9	17-18	To Perform Dynamic Routing using EIGRP	<a href="https://www.cisco.com/c/en/us/support/docs/ip/enhanced-interior-gateway-routing-protocol-eigrp/16406-eigrp-toc.html">https://www.cisco.com/c/en/us/support/docs/ip/enhanced-interior-gateway-routing-protocol-eigrp/16406-eigrp-toc.html</a>
10	19-20	To Perform Dynamic Routing using OSPF with Single area concept and Multiple Area Concept	<a href="https://www.learnccisco.net/courses/icnd-1/ip-routing-technologies/single-area-ospf.html">https://www.learnccisco.net/courses/icnd-1/ip-routing-technologies/single-area-ospf.html</a>

## 10. Action plan for different types of learners

Slow Learners	Average Learners	Fast Learners
<ul style="list-style-type: none"> <li>Remedial Classes on Saturdays</li> <li>Encouragement for improvement using Peer Tutoring</li> <li>Use of Audio and Visual Materials</li> <li>Use of Real-Life Examples</li> </ul>	<ul style="list-style-type: none"> <li>Workshops</li> <li>Formative Exercises used to highlight concepts and notions</li> <li>E-notes and E-exercises to read ahead of the pedagogic material.</li> </ul>	<ul style="list-style-type: none"> <li>Engaging students to hold hands of slow learners by creating a Peer Tutoring Group</li> <li>Design solutions for complex problems</li> <li>Design solutions for complex problems</li> <li>Presentation on topics beyond those covered in CHO</li> </ul>

## 11. Evaluation Scheme & Components:

Evaluation Component	Type of Component	No. of Assessments	Weightage of Component	Mode of Assessment
Component 2	Subjective Test/ Sessional Tests (STs)	02*	60%	ST-1 = Online Mode ST-2 = Certificate submission
Component 3	End Term Examinations	01**	40%	Online exam
<b>Total</b>		<b>100%</b>		

\* Students will have to appear in all Sessional Tests.

\* For successful completion of ST-1, Students needs to appear in Online Examination that having 20% of weightage.

\* For successful completion of ST-2, Students needs to complete the course CCNA-1 (Introduction to Network) and CCNA-2 (Switching, Routing and Wireless) from [www.netacad.com](http://www.netacad.com) each course having 20% of weightage.

\* Students are required to submit CCNA (1 and 2) completion Certificates.

\*\*As per Academic Guidelines, a minimum of 75% attendance is required to become eligible for appearing in the End Semester Examination.



## 12. Syllabus of the Course:

<b>Subject: Computer Networks / 22CS008</b>	
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S. No.	Topic (s)	No. of Sessions	Weightage %
1	<b>Introduction:</b> Uses of Computer Networks, Network Hardware Topologies, Collision Domain, Broadcast Domain, <b>Reference Models:</b> Seven-Layer OSI architecture, Concepts of Layers, Protocols and Layer interfaces and PDU, TCP/IP Reference Model, Comparison of OSI and TCP/IP reference models, <b>Physical Layer:</b> Transmission Media (Cable Media), Wireless Media (Cellular Telephone, Satellite Networks) Types of Connecting Devices (Hubs, Switches, Routers), <b>Ethernet Frames,</b> Ethernet and the OSI Model, Ethernet Frame Fields, Ethernet MAC Address, Frame Processing, Multicast MAC Address, Broadcast MAC Address, Unicast MAC Address, ARP and RARP, <b>Network Security:</b> Security Services, Security Threats, and Vulnerabilities, Network Attacks: Types of Malwares, Reconnaissance Attacks, Access Attacks, Denial of Service Attacks, <b>Network Attack Mitigations:</b> The Défense-in-Depth Approach Keep Backups, Firewalls, Types of Firewalls, Authentication, Authorization, and Accounting, <b>VLAN concept,</b> Configuration, Trunks, Trunking Protocol, WLAN concepts, Configuration, Wireless Network, <b>Network Layer:</b> Concept of IP packet and addresses, IPv4 protocol format, Routing Algorithm-Distance Vector Routing, Link State Routing, ICMP, IGMP, IPV6, Transition from IPv4 to IPv6(format), Network Classes (A, B, C, D) and Subnetting, Troubleshooting, <b>Static and Dynamic routing algorithms:</b> Shortest Path Routing, Routing Protocols (Static and Dynamic), <b>Routing Protocols:</b> OSPF, EIGRP, Introduction to BGP, Routing Information Protocol (v1 & v2), <b>Data Link Layer:</b> Types of Errors, Redundancy, Error Detection and Correction, CRC, Check Sum, Hamming code & Distance, <b>Multiple Access Protocols:</b> - <b>Random Access Protocols</b> –ALOHA, CSMA, CSMA/CA, CSMA/CD, <b>Channelization Protocols:</b> FDMA, TDMA, CDMA,	30	50%
<b>ST-1 (Covering 50% syllabus)</b>			
2	<b>Controlled Access Protocols:</b> Reservation, Polling, Token Passing, Piggybacking, <b>Noisy Channel:</b> Stop and Wait, Automatic Repeat Request, go-back-n, selective repeat, <b>Noiseless Channels:</b> Elementary data link protocols, Simplex, Stop and Wait Protocol, <b>Transport layer:</b> Services, Connection Less and Connection Oriented protocol, Transport Layer Protocols, TCP Connection, Transmission Control Protocol with Three-Way Handshaking, TCP / UDP Message Format, Congestion Control and Quality of Service, <b>Application Layer:</b> Domain Name System, Remote Logging, Electronic Mail, Introduction to FTP and WWW, Introduction to HTTP, SMTP and SNMP	40	100%
<b>End Term 100% syllabus</b>			

This Document is approved by:

Designation	Name	Signature
Course Coordinator	Dr. Amanpreet Kaur	
Head-Academic Delivery	Dr. Mrinal Paliwal	
Dean	Dr. Rishu Chhabra	
Dean Academics	Dr. Monit Kapoor	
Date	11.07.2024	