

## A. Course Handout | Prepared on 2nd January, 2023

Institute/School Name	Chitkara University Institute of Engineering & Technology		
Department Name	Computer Science & Engineering		
Programme Name	Bachelor of Engineering, Computer Science & Engineering		
Course Name	Introduction to Computer Networks	Session	2022-2023
Course Code	CS156	Semester/Batch	4 <sup>th</sup> / 2021
L-T-P (Per Week)	3-0-2	Course Credits	04
Course Coordinator	Dr. Amanpreet Kaur		

### 1. Objectives of the Course

The scope of the course is to provide 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 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 Outcomes

After completion of the course, students will be able to do the following:

- CO1:** Define the hardware, software, components of a network and the interrelations.
- CO2:** Explain the role of reference models and the hierarchical relationship of their respective layers.
- CO3:** Classify the networking protocols and select the appropriate protocol for a particular design.
- CO4:** Examine the concepts and theories of networking with the real world scenarios.
- CO5:** Design an enterprise network including topologies, protocols, management and security.

**CO-PO mapping grid | Program Outcomes (POs) are available as a part of Academic Program Guide (APG)**

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H		H		M						H
CO2	H	H	H	M	M	M					H	H
CO3	H	M		H	M	M					M	M
CO4	H	H		H		H						
CO5	H	H	H		M	M	M				M	H

### 3. Recommended Books (Reference Books/Text Books)

- RB1:** Data Communications and Networking' by Forouzan, 5<sup>th</sup> Edition, 2013.
- RB2:** Computer Networks' By Andrew S. Tanenbaum 5<sup>th</sup> Edition, Pearson Education, 2013.
- RB3:** Data and Computer Communications' by William Stallings, 8<sup>th</sup> Edition, Pearson, 2007.
- RB4:** CCNA Cisco Certified Network Associate Study Guide', by Todd Lammle, Wiley, 7<sup>th</sup> Edition, 2011.
- RB5:** Computer Networking: A Top-Down Approach', by Kurose and Ross, Pearson Education, 6<sup>th</sup> Edition, 2013.

## 4. Other readings and relevant websites:

S. 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>
7	<a href="https://www.slideshare.net/VidhuBaggan1/mps-by-vidhu">https://www.slideshare.net/VidhuBaggan1/mps-by-vidhu</a>

## 5. Recommended Tools and Platforms

1. Cisco Packet Tracer-7.3 or above versions, GNS3

## 6. Course Plan:

Lecture Number	Topics	Reference Books
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	RB1,RB5
4-5	<b>Reference Models:</b> Seven-Layer OSI architecture, Concepts of Layers, Protocols and Layer interfaces and PDU	RB1
6-7	TCP/IP Reference Model, Comparison of OSI and TCP/IP reference models	RB1, RB2
8-9	<b>Physical Layer:</b> Transmission Media (Cable Media), Wireless Media (Cellular Telephone, Satellite Networks) Types of Connecting Devices (Hubs, Switches, Routers)	RB1, RB3
10-11	<b>Data Link Layer:</b> Types of Errors, Redundancy, Error Detection and Correction, CRC, Check Sum, Hamming code & Distance	RB1
12-14	<b>Multiple Access Protocols:</b> - <b>Random Access Protocols</b> –ALOHA, CSMA, CSMA/CA, CSMA/CD	RB2
15-16	<b>Channelization Protocols:</b> FDMA, TDMA, CDMA	RB1, RB2
17-18	<b>Controlled Access Protocols:</b> Reservation, Polling, Token Passing, Piggybacking	RB1, RB2
19	<b>Noiseless Channels:</b> Elementary data link protocols: Stop and Wait	RB1, RB2
20-22	<b>Noisy Channel:</b> Stop and Wait, Automatic Repeat Request, go-back-n, selective repeat	RB1, RB3
23-25	<b>Network Layer:</b> Concept of IP packet and addresses, IPv4 protocol format, Routing Algorithm-Distance Vector Routing, Link State Routing	RB2, RB4
26-27	ICMP, IGMP, IPV6, Transition from IPv4 to IPv6(format)	RB2, RB4
28-30	<b>Static and Dynamic routing algorithms:</b> Shortest Path Routing, Routing Protocols (Static and Dynamic): RIPv1 & v2	RB1, RB2
31-33	Network Classes (A, B, C, D) and Subnetting	RB4
34-35	<b>Routing Protocols:</b> OSPF, EIGRP, Introduction to BGP	RB4
36	<b>Transport layer:</b> Services, Connection Less and Connection Oriented protocol, Transport Layer Protocols, TCP Connection	RB1, RB3

37-38	Three Way Handshaking, TCP / UDP Message Format	RB1
39	Congestion Control and Quality of Service	RB1, RB3
40-41	<b>Application Layer:</b> Domain Name System, Remote Logging, Electronic Mail	RB1, RB2
42-43	FTP, WWW, HTTP, SNMP	RB1, RB2
44-45	<b>Network Security:</b> Security Services, Digital Signature, Cryptography	RB1, RB5

## 7. Lab Plan

Sr. No.	Lab Number	Experiments	Learning Resource
1	1-2	Introduction of Cables, Network devices: Hub, Switches, Router etc.	<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>
2	3-4	Installation and Introduction to Packet Tracer	<a href="https://www.netacad.com/courses/packet-tracer">https://www.netacad.com/courses/packet-tracer</a>
3	5-6	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>
4	7-8	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>
5	9-10	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>
6	11-12	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>
7	13-14	Subnetting of Class A, B and C using FLSM	<a href="https://www.techtarget.com/searchnetworking/definition/fixed-length-subnet-mask">https://www.techtarget.com/searchnetworking/definition/fixed-length-subnet-mask</a>
8	15-16	Subnetting of Class A, B and C using VLSM	<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>
9	17-18	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>
10	19-20	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>
11	21-22	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>
12	23-24	To Perform Dynamic Routing using OSPF with Single area concept and Multiple Area Concept	<a href="https://www.learn-cisco.net/courses/icnd-1/ip-routing-technologies/single-area-ospf.html">https://www.learn-cisco.net/courses/icnd-1/ip-routing-technologies/single-area-ospf.html</a>
13	25-26	To Create and Apply ACL: Standard and Extended	<a href="https://www.geeksforgeeks.org/standard-access-list/">https://www.geeksforgeeks.org/standard-access-list/</a>

14	27-28	Creating and Managing Communication through VLAN	<a href="https://www.comparitech.com/net-admin/how-to-set-up-a-vlan/">https://www.comparitech.com/net-admin/how-to-set-up-a-vlan/</a>
15	29-30	To Apply NAT (Network Address Translation): Static	<a href="https://www.geeksforgeeks.org/network-address-translation-nat/">https://www.geeksforgeeks.org/network-address-translation-nat/</a> <a href="https://www.cisco.com/c/en/us/support/docs/ip/network-address-translation-nat/13772-12.html">https://www.cisco.com/c/en/us/support/docs/ip/network-address-translation-nat/13772-12.html</a>

## 8. Delivery/Instructional Resources

Lecture Number	Topics	PPT (Link of ppts on the central server)	Industry Expert Session (If yes: link of ppts on the central server)	Web References	Audio-Video
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/network-topology.html">https://www.cisco.com/c/en/us/solutions/automation/network-topology.html</a>	<a href="https://www.youtube.com/watch?v=uDulBxD7GM">https://www.youtube.com/watch?v=uDulBxD7GM</a>
4-5	<b>Reference Models:</b> Seven-Layer OSI architecture, Concepts of Layers, Protocols and Layer interfaces and PDU			<a href="http://www.ics.uci.edu/%7Emagda/Courses/networks270/ch2_v1.ppt">http://www.ics.uci.edu/%7Emagda/Courses/networks270/ch2_v1.ppt</a> <a href="https://slideplayer.com/slide/254123/">https://slideplayer.com/slide/254123/</a>	<a href="https://www.youtube.com/watch?v=vv4y_uOneC0">https://www.youtube.com/watch?v=vv4y_uOneC0</a>
6-7	TCP/IP Reference Model, Comparison of OSI and TCP/IP reference models			<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=2QGgEk20RXM">https://www.youtube.com/watch?v=2QGgEk20RXM</a>
8-9	<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/networks270/ch1_v1.ppt">http://www.ics.uci.edu/%7Emagda/Courses/networks270/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>
10-11	<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/network-working-fourzan-ppt-slides.html">http://www.engppt.com/2009/12/network-working-fourzan-ppt-slides.html</a>	<a href="https://www.youtube.com/watch?v=eQgRDd8D5Os">https://www.youtube.com/watch?v=eQgRDd8D5Os</a>
12-14	<b>Multiple Access Protocols: - Random Access Protocols–</b>			<a href="https://www.slideshare.net/amogha7/random-access-protocol-in">https://www.slideshare.net/amogha7/random-access-protocol-in</a>	<a href="https://www.youtube.com/watch?v=YAjfUc7Tt24">https://www.youtube.com/watch?v=YAjfUc7Tt24</a>

	ALOHA, CSMA, CSMA/CA, CSMA/CD			<a href="https://www.slideshare.net/SammarKhan2/fdmatdmacdma">communication-251294924</a>	
15-16	<b>Channelization Protocols:</b> FDMA, TDMA, CDMA			<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>
17-18	<b>Controlled Access Protocols:</b> Reservation, Polling, Token Passing, Piggybacking			<a href="https://www.slideshare.net/konupruthviraj/controlled-access-protocols">https://www.slideshare.net/konupruthviraj/controlled-access-protocols</a>	<a href="https://www.youtube.com/watch?v=4x0oT7AeNYs">https://www.youtube.com/watch?v=4x0oT7AeNYs</a>
19	<b>Noiseless Channels:</b> Elementary data link protocols: Stop and Wait			<a href="https://www.geeksforgeeks.org/noiseless-channel-protocol/">https://www.geeksforgeeks.org/noiseless-channel-protocol/</a>	<a href="https://www.youtube.com/watch?v=n09DfvmnTQ">https://www.youtube.com/watch?v=n09DfvmnTQ</a>
20-22	<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=YdkksvhkQGG">https://www.youtube.com/watch?v=YdkksvhkQGG</a>
23-25	<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=5ZuP5qjbKS">https://www.youtube.com/watch?v=5ZuP5qjbKS</a>
26-27	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.slideshare.net/satish486/ipv6-17005017">https://www.slideshare.net/satish486/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=xTqtm7-k25o">https://www.youtube.com/watch?v=xTqtm7-k25o</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=aor29pGhIFE">https://www.youtube.com/watch?v=aor29pGhIFE</a>
28-30	<b>Static and Dynamic routing algorithms:</b> Shortest Path Routing, Routing Protocols (Static and Dynamic): RIPv1 & v2			<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>
31-33	Network Classes (A, B, C, D) and Subnetting			<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=0qRcYFGK_60&amp;t=1134s">https://www.youtube.com/watch?v=0qRcYFGK_60&amp;t=1134s</a>

					<a href="https://www.indiabix.com/networking/subnetting/">https://www.indiabix.com/networking/subnetting/</a>
34-35	<b>Routing Protocols:</b> OSPF, EIGRP, Introduction to BGP			<a href="https://www.slideshare.net/escrimag/ospfppt-35277878">https://www.slideshare.net/escrimag/ospfppt-35277878</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=Z29ZzKeZHc">https://www.youtube.com/watch?v=Z29ZzKeZHc</a>
36	<b>Transport layer:</b> Services, Connection Less and Connection Oriented protocol, Transport Layer Protocols, TCP Connection			<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=MMDhvHYAF7E">https://www.youtube.com/watch?v=MMDhvHYAF7E</a>
37-38	Three Way Handshaking, TCP / UDP Message Format			<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/tcpudpicmpandthetransportlayer?qid=d2cf871d-baca-48bf-a3d8-bd1381325b54&amp;v=&amp;b=&amp;from_search=14">https://www.slideshare.net/tmavroidis/tcpudpicmpandthetransportlayer?qid=d2cf871d-baca-48bf-a3d8-bd1381325b54&amp;v=&amp;b=&amp;from_search=14</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>
39	Congestion Control and Quality of Service			<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=zjfPh7sar_Y">https://www.youtube.com/watch?v=zjfPh7sar_Y</a>
40-41	<b>Application Layer:</b> Domain Name System, Remote Logging, Electronic Mail			<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.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>
42-43	FTP, WWW, HTTP, SNMP			<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/http-protocol">https://www.slideshare.net/ToushikPaul/http-protocol</a>	<a href="https://www.youtube.com/watch?v=pnoWCK82apU">https://www.youtube.com/watch?v=pnoWCK82apU</a>
44-45	<b>Network Security:</b> Security Services, Digital Signature, Cryptography			<a href="https://www.slideshare.net/gichelleamon/network-security-12322065">https://www.slideshare.net/gichelleamon/network-security-12322065</a>	<a href="https://www.youtube.com/watch?v=1pIM07ChXMU&amp;list=PLJ5C6qdA">https://www.youtube.com/watch?v=1pIM07ChXMU&amp;list=PLJ5C6qdA</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=vBFauGoLC2wFGruY_E2gYtev">vBFauGoLC2wFGruY_E2gYtev</a> <a href="https://www.youtube.com/watch?v=yUel4nqvNs8">https://www.youtube.com/watch?v=yUel4nqvNs8</a>
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## 9. 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>

## 10. Evaluation Scheme & Components:

Evaluation Component	Type of Component	No. of Assessments	Weightage of Component
Component 1	Practical Lab / Formative Assessments (FAs)	03*	10%
Component 2	Subjective Test/Sessional Tests (STs)	02*	30%
Component 3	End Term Examinations	01	60%
<b>Total</b>		<b>100%</b>	

\* Out of 03FAs, the ERP system will automatically pick marks of the best 02 FAs for final marks evaluation of FAs.

\* Out of 02 STs, the ERP system automatically picks the average of best 01 ST marks for evaluation of the STs as final marks.

## 11. Details of Evaluation Components:

Evaluation Component	Description	Syllabus Covered (%)	Timeline of Examination	Weightage (%)
Component 01 (Formative Assessments (FAs))	FA01	Up to 25 %	Week 4	10%
	FA02	26 %-50%	Week 8	
	FA03	51%-75%	Week 12	
Component 02 (Subjective Test/Sessional Tests (STs))	ST 01	Up to 50%	Week 8	30%
	ST 02	51% - 100%	Week 13	
Component 03 (End Term Examinations)	End Term Examination*	100%	To be notified by Dean Examination	60%
<b>Total</b>				<b>100%</b>

\*As per Academic Guidelines minimum of 90% attendance is required to become eligible for appearing in the End Semester Examination

## 12. Syllabus of the Course:

S. No.	Topic	No. of Lectures	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)	9	12%
2	<b>Data Link Layer:</b> Types of Errors, Redundancy,Error Detection and Correction, CRC, Check Sum ,Hamming code & distance, <b>Multiple Access Protocols:- Random Access Protocols</b> –ALOHA,CSMA, CSMA/CA, CSMA/CD , <b>Channelization Protocols</b> : FDMA, TDMA,CDMA <b>Controlled Access Protocols:-</b> Reservation, Polling, Token Passing, Piggybacking, <b>Noiseless Channels:</b> Elementary data link protocols: Stop and Wait, <b>Noisy Channel:</b> Stop and Wait, Automatic Repeat Request, go-back-n, selective repeat	13	17.3%
3	<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),	5	6.7%
4	<b>Static and Dynamic routing algorithms:</b> Shortest Path Routing, Routing Protocols (Static and Dynamic): RIPv1 & v2, Network Classes (A,B,C,D) and Subnetting, Routing Protocols: OSPF, EIGRP, Introduction to BGP	8	10.7%
5	<b>Transport layer:</b> Services, Connection Less and Connection Oriented protocol,Transport Layer Protocols, TCP Connection, Three Way Handshaking, TCP / UDP Message Format, Congestion Control and Quality of Service	4	5.3%



6	<b>Application Layer:</b> Domain Name System, Remote Logging, Electronic Mail, FTP, WWW, HTTP, SNMP, <b>Network Security:</b> Security Services, Digital Signature, Cryptography	6	8%
7	Laboratory Experiments	30	40%

This Document is designed and approved by:

Designation	Name	Signature
Course Coordinator	Dr. Amanpreet Kaur	
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Date	02.01.2023	