

Department Name/ Institute Name	Department of Computer Science & Engineering/ Chitkara University Institute of Engineering & Technology	
Program Name	BE – Computer Science and Engineering	
Course Code	CSP 2203	
Course Name	Computer Networks Lab	
Labs (per week)	0-0-4	Course Credits 2
Course Coordinator Name	Er. Vidhu Baggan	

1. **Course Objectives**

The purpose of this course is to inculcate the skill in our students to construct and debug computer networks. At the successful completion of this course a student will be able to:

1. Provide practical knowledge of network devices and hands on experience with the topologies on real routers.
2. Segment the network with IPV4 as well as IPV6 addressing schemes.
3. Design and debug the network topology .
4. Interpret the utility and configuration of interior routing protocols
5. Construct secure networks through Access Control Lists.
6. Defend the private networks through Network Address translation.
7. Bifurcate the network with Virtual LAN.

2. **Recommended Books**

RB1: CCNA Study Guide by Sybex Publication.

RB2: CCNA Preparation Guide by Cisco Press.

3. **Other readings and relevant websites**

S.No.	Link of Journals, Magazines, websites and Research Papers
1.	http://www.brainbell.com/tutorials/Networking/
2.	http://www.techiwarehouse.com/cms/engine.php?page_id=d9e99072
3.	https://www.coursera.org/course/comnetworks
4.	http://www.cisco.com/c/en/us/support/docs/ip/network-address-translation-nat/13772-12.html

4. **Recommended Tools and Platforms:**

Cisco Packet tracer 6.3 or higher Versions

5. **Lab Plan**

S. No.	Experiment	Problem Statement Ref.	Lectures
1.	Introduction of Cables, Network devices : Hub, Switches, Router etc.	P(a)	1-2
2.	Introduction of Mac Address, IP addresses, Subnet Mask, Network Classes : A, B, C, D, E	P(c)	3-4
3.	To make cables: Cables: Straight Through, Crossover, Rollover	P(a)	5-6
4.	To do peer to peer connectivity, assign the IP address and share the resources	P(b)	7-8

5.	Introduction to Packet Tracer		9
6.	Simulation of Network Devices (HUB, Switches, Router) and connect more than two computers using Switch –Star Topology	P(a)	10-11
7.	Subnetting of Class A, B and C using FLSM	P(c)	12-13
8.	Subnetting of Class A, B and C using VLSM	P(c)	14-15
9.	Basic commands of Routers : hostname, password, Show Run, Show IP int brief, Assigning IP addresses to interfaces	P(h)	16-17
10.	To Perform Static Routing, Default Routing	P(d), P(e)	18-19
11.	To Perform Dynamic Routing using RIP (RIP-V1 and RIP-V2)	P(f)	20-21
12.	Creating DHCP Server, Mail Server, Web Server, Remote Access using Telnet and SSH	P(e)	22-23
13.	To Perform Dynamic Routing using EIGRP	P(g)	24-26
14.	To Perform Dynamic Routing using OSPF with Single area concept	P(g)	27-29
15.	To Perform Dynamic Routing using OSPF with Multiple area concept	P(g)	30-31
16.	To Create and Apply ACL : Standard	P(j)	32-33
17.	To Create and Apply ACL : Extended	P(j)	34-35
18.	To Apply NAT (Network Address Translation): Static	P(i)	36-38
19.	To Apply NAT (Network Address Translation): Dynamic and PAT	P(i)	39-40
20.	Switching Concepts (STP, DTP, VTP)		41-42
21.	Creating and Managing Communication through VLAN	P(c)	43-44
22.	Managing Inter-VLAN Communication	P(c)	45-46
23.	Practice with PT Activities		47-52
Ref. No.	Problem Statement		

P(a)	Consider the problem of designing a small network of computers. To accomplish this goal, Ethernet lines must be constructed and run between the machines. The construction costs for each possible link are based approximately on distance. Besides distance, the costs also reflect some restrictions due to physical boundaries. To connect all the machines in the office at minimal cost, try different configurations to connect them like (star, mesh, ring, bus) with the help of various other networking devices like (switch, repeater, hub, bridge).
P(b)	You have just started a new business. You need to have three to four workstations available for your employees who simply need to share some files and a printer, but you don't have a large budget. Security is not a major concern, but costs are. What type of network would be the most appropriate for your situation?
P(c)	Let us assume that Johnson & Co. is a small business firm with five departments each having twenty-five employees. Assuming each employee has a computer and each department has a printer, Johnson & Co. will need 125 nodes for computers and five for printers. It is also assumed that one department requires token ring, another requires fiber, and the rest of the departments requires 10 or 100 Mbps Ethernet. The network number assigned to Johnson & Co. is 201.222.5.0. The network administrator decides to create smaller networks, one for each department. This decision is based on different topology requirements for different departments, simplifying cabling, and easy administration of the network.
P(d)	Mr. Amit wants to connect Advertising department with Sales department. At First, he did not require WAN devices as both departments were having same Network Addresses .But Later on, he has to introduce Layer 3 devices because Network addresses were changed of both departments. Simulate the previous and present scenario using suitable commands to verify the connectivity.
P(e)	CEO of company ABC needs a system with network configuration that can communicable only with machines of managers of different departments. The path for communication between source and destination should be set by static routing.
P(f)	Mr. Gunit is feature-riffic and hence he wants to configure the routers with the protocol having many features. He does not scare off the complexities of the protocol to be implemented but he is certain about one thing that the protocol should be open and not proprietary. Perform the following as per his need: Simulate a topology. <ul style="list-style-type: none"> • Implement small and medium sized networked dynamic routing protocol. • Routing updates are multicast. • Minimize broadcast traffic. • Send periodic routing updates. Hint: This routing protocol is distance vector style.
P(g)	Perform the following as per scenario mentioned in experiment 6: <ul style="list-style-type: none"> • Simulate a topology. • Implement dynamic routing protocol that sends no Broadcasts and consumes less bandwidth and supports multiple network layer protocols. • Send partial updates as needed. Hint: Hybrid Distance Vector/Link State algorithm
P(h)	Perform the following as per scenario mentioned in experiment 6: <ul style="list-style-type: none"> • Simulate a topology. • Implement loop free dynamic routing protocol. • Balance the network traffic using multiple paths. • Send immediate routing updates rather than periodically. Hint: This protocol supports VLSM, CIDR, and supernetting.
P(i)	A company has only one public IP address but several private IP address dynamically assigned by the DHCP server for all its computers. NAT application (Router, Firewall) would change the source address (private IP address) on every outgoing packet from the internal computers in to the single public IP address. But it assigns a different source port for packets coming from each computer, so that while the packets return with a single public IP address, it can still remember which packet needs to go to which computer (Every IP address has source IP, destination IP and associated port numbers). Of course, while coming back, the packets are re-assigned with its respective private IP address of the computer it needs to go to and the public IP address is discarded by the NAT application. This process is managed by a port mapping table managed by the NAT application, for all the incoming and outgoing packets from a network. Perform the following tasks based on mentioned scenario: <ul style="list-style-type: none"> • Design a topology consisting of a private and public network, and configure NAT. • Provide NAT table for every incoming and outgoing packet. • Display all NAT translations. • Allow internal users to connect to internet.

P(J)	<p>In the mentioned scenario above:</p> <ul style="list-style-type: none"> • Implement standard and extended ACL. • Create an ACL to permit and deny a specific host, protocol. <p>Bind ACL to an interface</p>
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6. Evaluation Scheme:

Lab Component 1*	Lab Performance	40
Lab Component 2	Internal Viva – Voce	20
Lab Component 3**	External Viva	40
	Total	100

*Lab performances will be evaluated periodically.

**The End Term examination for practical courses is held at the end of semester and includes conduct of experiment and an oral examination (viva voce). The mandatory requirement of 75% attendance in all lab classes is to be met for being eligible to appear in this component.

7. Details of Evaluation Component 1 and Component 2

Description	Marks	To be held in week	Remarks
Lab Performance 1	20	4 th – 5 th week	Practical Performance(10 marks) + Viva (5 marks) + File Work(5 marks)
Lab Performance 2	20	8 th – 9 th week	Practical Performance(10 marks) + Viva (5 marks) + File Work(5 marks)
Internal Viva	20	12 th week	Practical Performance(10 marks) + Viva (5 marks) + File Work(5 marks)

This document is approved by

Designation	Name	Signature
Course Coordinator	Er. Vidhu Baggan	
Associate Dean	Er. Sudha Goyal	
Deputy Dean	Er. Meenu Khurana	
Date	08-Jan-2018	