INSTITUTE OF COMPUTER TECHNOLOGY

B-TECH COMPUTER SCIENCE ENGINEERING 2025-26

SUBJECT:COMPUTER NETWORKS

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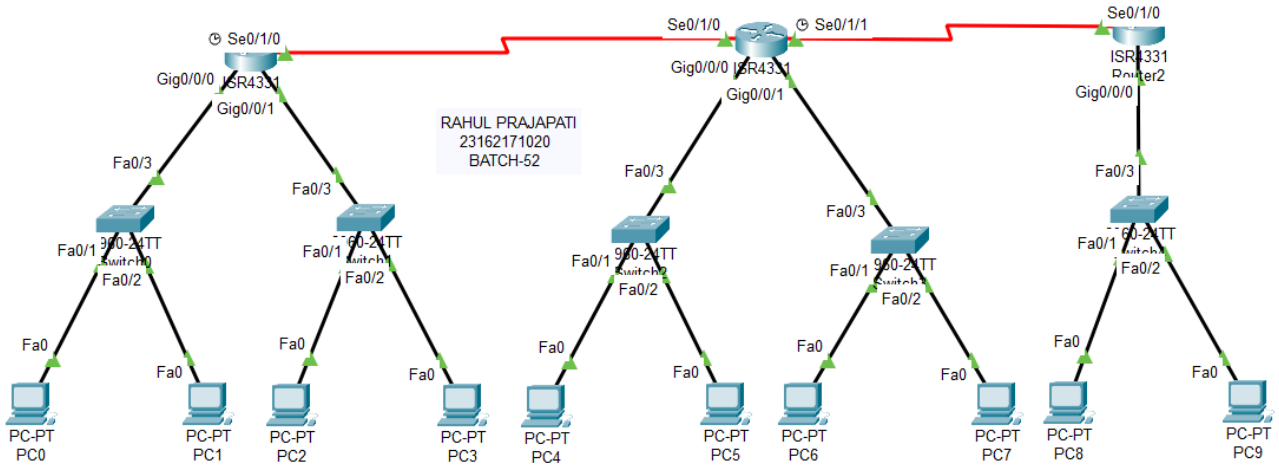
BRANCH: CYBER SECURITY

BATCH: 52

PRACTICAL_06

Aim: Design a Network of an organization using fundamentals of subnetting.

1. Design:



2. Calculate the number of bits required for host as per the given problem.

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2) Calculate the number of bits required for host as per given problem.

⇒ According to given problem.

lets calculate IP addresses for one network.

* each network contains 2 PCs. So.

192.168.10.0 → Network IP.
192.168.10.1 → Default Gateway
192.168.10.2 → PC0
192.168.10.3 → PC1
192.168.10.4 }
192.168.10.5 } Free IPs
192.168.10.6 }
192.168.10.7 → Broadcast IP.

So total 8 IP required for given problem.
So we required 3 bits. for host.

11111111.11111111.11111111.11111HHH
Network bits. Host bits

255.255.255.240 → Subnet mask.

Note: FOR THIS PRACTICAL WE TAKE 4 BITs.

3. **Get subnet mask for subnetting:** (BY TAKING 4 BIT FOR HOST)

Old Subnet mask (Decimal form)	255.255.255.0
Old Subnet mask (Binary form)	11111111.11111111.11111111.00000000
New Subnet mask (Binary form)	255.255.255.240
New Subnet mask (Decimal form)	11111111.11111111.11111111.11110000

4. IP_CONFIGURATIONs_ON_PCs

DEPARTMENT	SUB_NETWORK	DEVICE	IP ADDRESS	SUBNET MASK	DEFAULT GATEWAY
ROUTER_0	192.20.10.0	PC0	192.20.10.2	255.255.255.240	192.20.10.1
		PC1	192.20.10.3		
	192.20.10.16	PC2	192.20.10.18	255.255.255.240	192.20.10.17
		PC3	192.20.10.19		
ROUTER_1	192.20.10.32	PC4	192.20.10.34	255.255.255.240	192.20.20.33
		PC5	192.20.10.35		
	192.20.10.48	PC6	192.20.10.50	255.255.255.240	192.20.10.49
		PC7	192.20.10.62		
ROUTER_2	192.20.10.64	PC8	192.20.10.66	255.255.255.240	192.20.30.65
		PC9	192.20.10.78		

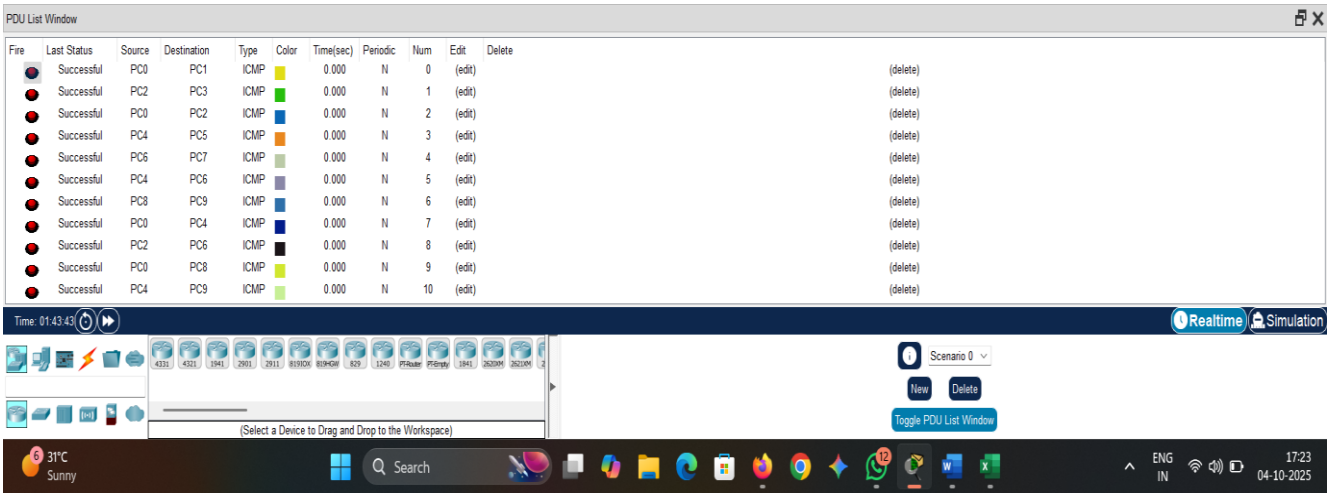
5. IP_CONFIGURATIONs_ON_ROUTERs

DEVICE	INTERFACE	IP_ADDRESS	SUBNET_MASK	STATUS
ROUTER_0	Gig 0/0/0	192.20.10.1	255.255.255.240	ON
	Gig 0/0/1	192.20.10.17	255.255.255.240	
	Se 0/1/0	10.0.0.1	255.0.0.0	
ROUTER_1	Gig 0/0/0	192.20.10.33	255.255.255.240	ON
	Gig 0/0/1	192.20.10.49	255.255.255.240	
	Se 0/1/0	10.0.0.2	255.0.0.0	
	Se 0/1/1	20.0.0.1	255.0.0.0	
ROUTER_2	Gig 0/0/0	192.20.10.65	255.255.255.240	ON
	Se 0/1/0	20.0.0.2	255.0.0.0	

6. Configure static routing table (STATIC in routers)

DEVICE	NETWORK	SUBNET_MASK	NEXT_HOP
ROUTER_0	192.20.10.32	255.255.255.240	10.0.0.2
	192.20.10.48		
	192.20.10.64		
ROUTER_1	192.20.10.0	255.255.255.240	10.0.0.1
	192.20.10.16		
	192.20.10.64		20.0.0.2
ROUTER_2	192.20.10.0	255.255.255.240	20.0.0.1
	192.20.10.16		
	192.20.10.32		
	192.20.10.48		

7. Network_Communication



Conclusion: In this practical, we designed a network for Zenith Enterprise using subnetting to divide a single IP range into 5 smaller networks. Each department was given a subnet with 16 IP addresses, which is enough for 14 devices while minimizing IP wastage. We also identified and reserved the network and broadcast addresses for each subnet. This setup ensures efficient use of IP addresses and organized network management.