**ORCHID INTERNATIONAL COLLEGE**

**Full Marks: 60**

**Time: 3 Hrs**

**SET A**

**Bijaychowk, Gaushala-9, Kathmandu**

**Pre Board Examination -2081**

**BIM / Fourth Semester / IT 240: Business Data Communication and Networking**

***Candidates are required to answer the question in their own words as far as practicable.***

**Group "A" (Brief Answer Questions)**

1. **Attempt ALL the questions. [10 × 1 = 10]**
2. Differentiate between LAN and WAN.
3. Define asynchronous transmission.
4. Name two protocols that operate at the Transport Layer of the OSI model.
5. What is the purpose of a subnet mask in IP addressing?
6. Explain the term "bandwidth" in the context of network communication.
7. How does a hub differ from a switch in network topology?
8. What is the role of a Network Interface Card (NIC)?
9. What is WiMAX, and how is it different from Wi-Fi?
10. Differentiate between circuit-switched and packet-switched networks.
11. Define tunneling in the context of Virtual Private Networks (VPN).

**Group "B" (Short Answer Questions)**

**Attempt any FIVE questions: [5 × 3 = 15]**

1. Explain any three types of networking devices.
2. Explain the process of data encapsulation in the OSI model.
3. Explain the difference between HTTP and HTTPS protocols.
4. What are the functions of the transport layer in the OSI model?
5. Encode the binary sequence 101101 using the NRZ-L (Non-Return to Zero-Level) encoding technique.
6. How can improving device performance benefit WAN operations?

**Group "C" (Long Answer Questions)**

**Attempt any THREE questions: [3 × 5 = 15]**

1. Explain how CSMA/CD works in Ethernet networks.
2. Compare and contrast IPv4 and IPv6.
3. Define VPN and explain its types.
4. Given a message 1011101 and a generator polynomial x³+x+1, calculate the Cyclic Redundancy Check (CRC) code that will be appended to the message for transmission. Also perform error detection.

**Group "D" (Comprehensive Questions)**

**Attempt ALL the questions. [2 × 10 = 20]**

1. Your company has been assigned the IP block 202.45.12.0/24. You need to create six subnets, each having an equal number of IP addresses. Calculate the subnet IDs, broadcast addresses, and range of available IP addresses for each subnet.
2. As a network administrator for a growing company, you have been tasked with designing a scalable network. Explain the key steps you would follow in the Building-Block Network Design Process and how you would ensure that the network meets the current and future needs of the organization.

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**SET B**

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**Time: 3 Hrs**

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**BIM / Fourth Semester / IT 240: Business Data Communication and Networking**

***Candidates are required to answer the question in their own words as far as practicable.***

**Group "A" (Brief Answer Questions)**

1. **Attempt ALL the questions.: [10 × 1 = 10]**
2. Define data communication.
3. What is a MAC address, and why is it important in networking?
4. Define latency and its impact on network performance.
5. Define the term "Quality of Service (QoS)" in networking.
6. What is the difference between synchronous and asynchronous transmission?
7. What is the role of the Dynamic Host Configuration Protocol (DHCP)?
8. Define the term "multicasting."
9. What is a firewall? Mention any two functions of it.
10. What are the advantages of IMAP over POP?
11. How can the attenuation problem be overcome in Digital Signal Transmission?

**Group "B" (Short Answer Questions)**

**Attempt any FIVE questions: [5 × 3 = 15]**

1. What are the different types of network topologies? Explain with examples.
2. What are the functions of the network layer in the OSI model?
3. Encode the binary data 110011 using Manchester Encoding.
4. What are the key benefits of using Virtual Private Networks (VPNs)?
5. Explain how a managed network improves traffic management.
6. How does the DNS system resolve domain names to IP addresses?

**Group "C" (Long Answer Questions)**

**Attempt any THREE questions: [3 × 5 = 15]**

1. Discuss the working of the CSMA/CA protocol in Wireless networks.
2. Explain IPV4 header format with suitable diagram.
3. What is VLAN? Explain Benefits of VLAN and how VLANs work?
4. A 7-bit data word 1011001 is transmitted. Calculate the Hamming code that should be transmitted, showing the placement of parity bits and the overall code.

**Group "D" (Comprehensive Questions)**

**Attempt ALL the questions. [2 × 10 = 20]**

1. Your college network has an IP range of 192.168.5.0/24, and you need to divide it into three subnets. Calculate the subnet IDs, broadcast addresses, and the valid range of IP addresses for each subnet.
2. Designing for network performance involves multiple aspects, including monitoring and managing failures. Explain the methods you would implement for Performance and Fault Management in a network, focusing on network monitoring, failure control, and improving overall network performance.