

KATHMANDU UNIVERSITY  
End Semester Examination  
February, 2025

Marks Scored:

Level : B.E./B.Sc.  
Year : II

Course : COMP 204  
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date : 11 FEB 2025

SECTION "A"

[20 Q. × 0.5 = 10 marks]

Choose and mark [X] in the most appropriate option from each set of choices

- How many physical links are required in a fully connected mesh network with  $n$  nodes?  
  $n(n-1)$         $n(n-1)/2$         $n^2$         $(n-1)/2$
- A packet at the network layer is normally called as \_\_\_\_\_  
 bit stream       datagram       segment       frame
- The frequency of a certain electromagnetic wave is  $4 \times 10^{14}$  Hz, and its speed in air is approximately  $3 \times 10^8$  m/s. What is the wavelength in micrometers ( $\mu\text{m}$ )?  
  $0.75 \mu\text{m}$         $0.50 \mu\text{m}$         $0.60 \mu\text{m}$         $0.70 \mu\text{m}$
- What does isochronous transmission guarantee?  
 Variable data rate arrival of data frames  
 Fixed data rate arrival of data frames  
 No synchronization between sender and receiver  
 Random arrival of data frames
- The average number of successfully transmitted frames ( $S$ ) for pure ALOHA is given by the formula  $S = G \times e^{-2G}$ . What does "G" represent in this formula?  
 The number of frames in the buffer  
 The arrival rate of frames  
 The average number of frames generated by the system during one frame transmission time  
 The transmission probability per frame
- Why is jitter a problem in network communication?  
 It causes packet loss, making data transmission impossible.  
 It leads to variable delays in packet delivery, affecting time-sensitive applications like audio and video.  
 It increases the overall bandwidth usage of a network.  
 It ensures all packets arrive at the same time, improving communication speed.
- For a dataword of 1001, the divisor of 1011 and  $n-k=3$ , the final codeword is  
 1001111       1001000       1001001       1001110
- Bit stuffing is the process of adding one extra 0 whenever \_\_\_\_\_ consecutive 1s follow a 0 in the data.  
 five       eight       nine       six

9. Vulnerable time for CSMA is  
  $T_{fr}$                         $2 \times T_{fr}$                         $T_p$                         $2 \times T_p$
10. In a Walsh table, the number of sequences ( $N$ ) is determined by which of the following formulas, where  $m$  represents the number of bits?  
  $N = m^2$                         $N = 2^m$                         $N = m$                         $N = 2 \times m$
11. Carrier Sense Multiple Access with Collision Detection (CSMA/CD) was designed for  
 wireless networks                       wire networks  
 both (wireless as well as wire) network                       Optical fiber networks
12. What is the port number of the FTP?  
 21                       53                       25                       110
13. Which address is correct address of "This-host Address" ?  
 255.255.255.255/32                       0.0.0.0/32  
 127.0.0.0/8                       224.0.0.0/4
14. An easy solution for ensuring good quality of service \_\_\_\_\_, which involves building a network with enough capacity to handle any traffic.  
 overprovisioning                       RED                       Load Shedding                       Jitter
15. In the setup phase of the virtual circuit approach, \_\_\_\_\_ auxiliary packets must be exchanged between the sender and receiver.  
 one                       two                       three                       four
16. Which attacks is associated with "Threat to confidentiality"  
 Modification                       Snooping                       Masquerading                       Replaying
17. Which of the following values in the TCP header indicates a connection termination?  
 RST                       SYN                       URG                       FIN
18. To guarantee correction of up to  $t$  errors in all cases, the minimum Hamming distance in a block code must be:  
  $d_{min} = t$                         $d_{min} = 2t$                         $d_{min} = 2t + 1$                         $d_{min} = t + 1$
19. Which DNS record is used to identify the authoritative servers for a zone?  
 MX                       NS                       SOA                       CNMA
20. The notation is informally referred to as *slash notation* and formally as  
 classless interdomain routing                       class interdomain routing  
 classless addressing                       class domain route

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11 FEB 2025

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Semester : II  
F. M. : 40

SECTION "B"

[6 Q. × 4 = 24 marks]

Attempt *ANY SIX* questions:

1. Compare and contrast the OSI model with the TCP/IP model. Highlight the key differences in their structure and functionality. [4]
2. What is a monoalphabetic cipher, and how does it differ from a transposition cipher? [4]
3. Draw a diagram of the TCP Header and explain its functionality. [4]
4. Explain "count to infinity" problem with suitable example with suitable diagram. [4]
5. The size of the window must be less than  $2^m$  and the size of the receiver window should be in the Go-Back-N protocol. Explain with suitable diagram. [4]
6. a. A nonperiodic composite signal contains frequencies from 10 to 30 KHz. The peak amplitude is 10 V for the lowest and the highest signals and is 30 V for the 20-KHz signal. Assuming that the amplitudes change gradually from the minimum to the maximum, draw the frequency spectrum. [4]
7. Write short notes on (*ANY TWO*) [2+2]
  - a. Network Allocation Vector
  - b. Domain Name System
  - c. Wine Policy

SECTION "C"

[2 Q. × 8 = 16 marks]

Attempt *ANY TWO* questions:

8. a. An ISP is granted the block 16.12.64.0/20. The ISP needs to allocate address for 4 organization with each with 508 addresses. Find the number and ranges of addresses in the ISP block. Find the range of addresses for each organization and the range of unallocated address. [6]
- b. Prove that a receiving station can get the data sent by a specific sender if it multiplies the entire data on the channel by the sender's chip code and then divides it by the number of stations. [2]

P.T.O.

9. a. Explain following special address: "This-host address", "Limited-broadcast address", "Loopback address", "Private Address" and "Multicast addresses". [5]
- b. What are the key differences between non-adaptive routing and adaptive routing algorithms and in what scenarios is each type preferred? [3]
10. Critically analyze **Open-loop and Closed-loop congestion control** in network communication. Compare their approaches and discuss their effectiveness. Explain [4+4] the different congestion prevention policies used in Open-loop control.