KATHMANDU UNIVERSITY
End Semester Examination
January/February 2024

Marks Scored:

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

28 JAN 2024

Course : COMP 204
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date :

SECTION "A"
[20Q. × 0.5 = 10 marks]

Encircle the most appropriate answer.

1. In ..... Transmission, the channel capacity is shared by both communicating devices at all times.
   a. simplex b. half-duplex c. full-duplex d. half-simplex

2. Frequency of failure and network recovery time after failure are measures of the ..... of a network
   a. Performance b. Reliability c. Security d. Vulnerability

3. Ethernet uses a .... physical address that is imprinted on the network interface card(NIC).
   a. 32 bit b. 64 bit c. 6 byte d. 8 byte

4. ..... is a type of transmission impairment in which the signal loses strength due to the different propagation speeds of each frequency that makes up the signal.
   a. Noise b. Attenuation c. Decibel d. Distortion

5. To guarantee the detection of up to 5 errors in all cases, the minimum hamming distance in a block code must be.....
   a. 6 b. 5 c. 4 d. 8

6. A generator that contains a factor of ..... can detect all odd-numbered errors.
   a. x b. x+1 c. 1 d. x/2

7. For stop and wait ARQ, for 10 data packets sent, ... acknowledgements are needed.
   a. exactly 10 b. less than 10 c. more than 10 d. none of the mentioned

8. In Go-Back N ARQ, if 5 is the number of bits for the sequence number, then the maximum size of the send window must be
   a. 1 b. 15 c. 16 d. 31

9. In a block, the prefix length is /15; what is the mask?
   a. 255.254.0.0 b. 255.255.255.0 c. 255.255.255.128 d. 255.255.0.0

10. What is the first address of the block of classless address if one of the addresses is 12.2.2.127/28?
a. 12.2.2.0 b. 12.2.2.96 c. 12.2.2.112 d. 12.2.2.120

11. The maximum data rate of a channel for a noiseless 3 KHz channel having level 2 is:
a. 3000 bps b. 1500 bps c. 6000 bps d. 1200 bps

12. Maximum data rate of a channel of 3000 Hz bandwidth and SNR of 30db is:
a. 30000 b. 40000 c. 50000 d. 60000

13. What is the number of sequences if we have 90 stations in our CDMA network?
a. 64 b. 32 c. 256 d. 128

14. In hamming code C(7,4) with dmin=3, three bit syndromes creates eight different bit patterns that creates eight different conditions. Which of the following option shows no error or the error in parity bit only?
a. 000, 001, 010, 100 b. 011, 101, 110, 111
c. 001, 010, 011, 101 d. 100, 101, 110, 111

15. A signal travels through a medium and its power is reduced to two-third. The attenuation is....
a. -1.67dB b. -1.76dB c. -2.15dB d. -2.51dB

16. In CRC, for a data of 12 bits and the divisor being 4^{th} power of x, the transmitted data will be of :
a. 1 byte b. 2 byte c. 3 byte d. 4 byte

17. The technique that requires no network information is .....
a. Flooding b. RIP c. OSPF d. EIGRP

18. Encryption and Decryption of data are responsibility of :
a. Network Layer b. Session Layer
c. Application Layer d. Presentation Layer

19. In symmetric cryptography, which of the following must be **TRUE**?
a. Encryption and decryption take the same amount of time
b. Different algorithms are used for encryption and decryption
c. Cryptographic operations are one-way, and not reversible
d. The same key is used for encryption and decryption

20. IEEE project 802 divides the data link layer into which upper sub-layer and lower sub-layer?
a. LLC, MAC b. HDLC, PDU c. MAC, LLC d. PDU, HDLC

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SECTION "B"
[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. Explain in detail how HTTP application works with reference to TCP/IP protocol suit.

2. Discuss the factors causing transmission impairment. A signal with 100 milliwatts power passes through 10 devices, each with an average noise of 2 microwatts. What is the SNR? What is the SNRdb? [3+0.5+0.5]

3. How are data rate calculated? What is the total delay (latency) for a frame of size 5 million bits that is being sent on a link with 10 routers each having a queuing time of 2μs and a processing time of 1μs. The length of the link is 2000 Km, the speed of light inside the link is 2×10^8 m/s and the link has a bandwidth of 5 Mbps. [1+3]

4. Explain Stop and Wait ARQ with necessary flow diagram. State the limitation of Go-Back-N protocol. [3+1]

5. How does congestion form in a network? Explain with suitable diagram, how Leaky Bucket implementation can shape traffic to maintain regulated flow. [1+3]

6. Explain the classification of security requirements. Differentiate between symmetric encryption and asymmetric encryption. [2+2]

7. Write Short Notes on (*ANY TWO*): [2Q × 2 = 4 marks]
   a. Network Topology
   b. TCP handshake procedure
   c. Count to Infinity Problem
   d. Guided Media

SECTION "C"
[2Q × 8 marks = 16 marks]

Attempt *ANY TWO* questions.

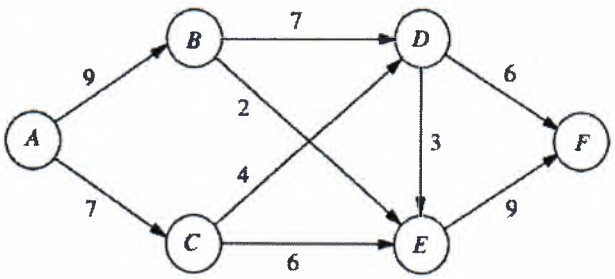
8. a. Explain working of CSMA/CD random access protocol with suitable flow diagram and working of the algorithm with suitable flowchart. [6]

   b. In a bus CSMA/CD network with a data rate of 10 Mbps, a collision occurs 20μs after the first bit of the frame leaves the sending station. What should be the length of the frame so that the sender can detect the collision? [2]

9. a. What are linear block codes? Differentiate between Hamming Code and Cyclic Redundancy Check. Make an analysis on how e(x) errors that are divisible by g(x) are not caught. [1+2+3]

b. Given a dataword $x^5 + x^3 + x^2 + 1$ and a divisor $x^4 + x + 1$, find the codeword at the transmitter end. Find the syndrome at the receiver end assuming no error in the transmission. [1+1]

10. a. Outline the major function of Network Layer. Given a network subnet, calculate the shortest path using Dijkstra's Algorithm. [1+4]



b. An organization is granted a block of address with the beginning address 14.24.74.0/24. The organization needs to have 3 subblocks of addresses to use in its three subnets: one subblock of 10 address, one subblock of 60 addresses and one subblock of 120 addresses. Design the subblock. [3]