KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

Marks Scored:

Level : B.E./B.Sc.
Year : II
Course : COMP 204
Semester : II
Exam Roll No. :
Time: 30 mins.
F. M. : 10
02 JUL 2023
Registration No.:
Date :

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Tick [√] the most appropriate answer from the alternatives given. All symbols have their usual meanings

1. A period of 100 ms in microseconds.
[ ] $10^5\ \mu s$ [ ] $10^{-6}\ \mu s$ [ ] $10^6\ \mu s$ [ ] $10^{-5}\ \mu s$

2. If a periodic signal is decomposed into five sine waves the frequencies of 100, 300, 500, 700 and 900 Hz, what is its bandwidth?
[ ] 100 [ ] 900 [ ] 800 [ ] 500

3. Low Frequency (LF) ranges from _____.
[ ] 3 - 30 kHz [ ] 30 - 300 kHz [ ] 30 - 300 MHz [ ] 30 - 300 GHz

4. _____ noise is the random motion of electrons in a wire, which creates an extra signal not originally sent by the transmitter.
[ ] Thermal [ ] Induced [ ] Crosstalk [ ] Impulse

5. The concept of "angle of incidence" is used in _____.
[ ] Twisted-Pair Cable [ ] Coaxial Cable
[ ] Fiber-Optic Cable [ ] Infrared

6. A code scheme has a Hamming distance d_{min} = 5. This code guarantees the detection of up to _____ errors.
[ ] 2 [ ] 3 [ ] 4 [ ] 5

7. A simple parity-check code is a single-bit error-detecting code in which _____
[ ] n= k with d_{min}=2 [ ] n= k+1 with d_{min}=2
[ ] n= k+1 with d_{min}=1 [ ] n= k+2 with d_{min}=1

8. 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 slotted ALOHA is _____
[ ] T_{fr} [ ] $2\times T_{fr}$ [ ] T_p [ ] $2\times T_p$

10. Which one of the following is a controlled-access protocol?
[ ] CSMA/CD [ ] Polling [ ] CDMA [ ] Slotted ALOHA

11. Carrier sense multiple access with collision avoidance (CSMA/CA) was invented for _____
[ ] wireless networks [ ] wire networks
[ ] both (wireless as well as wire) network [ ] none

12. What is the port number of the DNS?
[ ] 21 [ ] 53 [ ] 25 [ ] 110

13. In class A of classful addressing, there are only _____ networks in the world that can have a class A address.
[ ] 8 [ ] 32 [ ] 64 [ ] 128

14. Which one is **TRUE**?
[ ] A leaky bucket algorithm shapes bursty traffic into fixed-rate traffic by averaging the data rate. It doesn't drop the packets if the bucket is full.
[ ] A leaky bucket algorithm shapes bursty traffic into fixed-rate traffic by averaging the data rate. It may drop the packets if the bucket is full.
[ ] A leaky bucket algorithm shapes bursty traffic into variable-rate traffic by averaging the data rate. It doesn't drop the packets if the bucket is full.
[ ] A leaky bucket algorithm shapes bursty traffic into variable-rate traffic by averaging the data rate. It may drop the packets if the bucket is full.

15. In cyclic codes, multiplying $(x^5 + x^3 + x^2 + x)$ polynomial by another $(x^2 + x + 1)$ polynomial is equal to
[ ] $(x^7 + x^6 + x^5 + x^4 + x)$ [ ] $(x^7 + x^5 + x^3 + x)$
[ ] $(x^7 + x^3 + x^2 + x)$ [ ] $(x^7 + x^6 + x^3 + x)$

16. Which attacks is **NOT** associated with "Threat to integrity"?
[ ] Modification [ ] Snooping [ ] Masquerading [ ] Replaying

17. For *m* size header the size of receive slide window for selective repeat protocol is _____
[ ] 1 [ ] 2^m [ ] 2^{m-1} [ ] 2^{m+1}

18. The loss in a cable is usually defined in decibels per kilometer. If the signal at the beginning of a cable with – 0.3 dB/km has a power of 2 mW, the power of the signal at 5 km is _____
[ ] 1.3 mW [ ] 1.4 mW [ ] 1.5 mW [ ] 1.6 mW

19. The central concept in detecting or correcting errors is _____
[ ] Redundancy [ ] Burst [ ] Datawords [ ] Codewords

20. The first and the last IP address of a given ip address 124.41.239.128/27 is _____
[ ] 124.41.239.128 and 124.41.239.159 [ ] 124.41.239.0 and 124.41.239.159
[ ] 124.41.239. 128 and 124.41.239.255 [ ] 124.41.239.0 and 124.41.239.255

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Time : 2 hrs. 30 mins.

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Semester : II
F. M. : 40

SECTION "B"

[6 Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. Name four basic network topologies, and cite an advantage of each type. [4]

2. Give a brief account of twisted-Pair cable. Explain the function of the twisting in twisted-pair cable. [1+3]

3. 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]

4. Explain why collision is an issue in random access protocols but not in controlled access protocols. [4]

5. Explain three way handshake protocol with clear flow diagram [4]

6. Explain leaky bucket and token bucket algorithm. Briefly explain which among the two is more efficient and why? [2+2]

7. Write short notes on *ANY TWO* [2+2]
   a. Transposition Cipher
   b. DNS
   c. UDP

SECTION "C"

[2 Q. × 8 =16 marks]

Attempt *ANY TWO* questions.

8. a. Explain with diagram for encoder and decoder how simple parity check code works. Assuming 4 bit dataword generate all possible codeword. Show that simple parity check guarantees to detect any odd number of errors. [6]

   b. What are the values of Signal-to-Noise Ratio (SNR) and SNR_{db} for a noiseless channel? [2]

9. a. There is no acknowledgement mechanism in CSMA/CD, but we need this mechanism in CSMA/CA. Explain the reason. [5]

b. How many signal levels do we need if we send 265 kbps over a noiseless channel with a bandwidth of 20 kHz. [3]

10. a. What are the security goals? Explain each of them with suitable example based upon your understanding. [3]

b. Define latency. What is the latency for a 2.5-KB an email if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4 × 108 m/s. [1+4]

Note: The queuing time is not a fixed factor; it changes with the load imposed on the network. Therefore, consider queuing time and processing delay is equal to zero.