

United College of Engineering and Research, Allahabad

Department of Computer Science & Engineering

B.Tech CSE- VI Semester

Set-2

Course Name: Computer Network

AKTU Course Code: KCS-603

1. What is the minimum number of redundant bits needed to detect and correct a single-bit error in a data block of length 16 using a Hamming code?
A. 2
B. 3
C. 4
D. 5
2. Which of the following is not a property of a good checksum algorithm?
A. Simple and efficient computation
B. Sensitive to all errors
C. Can detect errors with high probability
D. Can detect errors with low probability
3. Which of the following is an advantage of CRC over checksum?
A. CRC is more efficient than checksum
B. CRC can detect more types of errors than checksum
C. CRC can correct errors as well as detect them
D. CRC is simpler to compute than checksum
4. Which of the following is a disadvantage of Hamming code?
A. It can correct any number of errors in a data block
B. It requires a large number of redundant bits for longer data blocks
C. It is less efficient than CRC for error detection
D. It is less reliable than checksum for error detection
5. If a data segment of 110101 is transmitted using a 4-bit checksum, what is the value of the checksum that is appended to the data segment using 1's complement arithmetic?
A. 0001
B. 1110
C. 1011
D. 0100
6. How many data bits can be transmitted using a Hamming code with a block length of 16 and 5 redundant bits?
A. 8
B. 10

- C. 11
- D. 12

7. What is the minimum Hamming distance required for a Hamming code to detect and correct up to two errors in a data block of length 8?

- A. 2
- B. 3
- C. 4
- D. 5

8. What is the maximum number of errors that can be corrected by a Hamming code with a block length of 7?

- A. 1
- B. 2
- C. 3
- D. 4

9. What is the binary representation of the polynomial $x^3 + x + 1$?

- A. 1101
- B. 1001
- C. 1011
- D. 1110

10. If the checksum of a data segment is 10101101, what is the value of the 1's complement of the checksum?

- A. 10101101
- B. 01010010
- C. 01010011
- D. 10101110

11. What is the generator polynomial for a CRC with a degree of 4?

- A. $x^4 + x^3 + x^2 + x + 1$
- B. $x^4 + x + 1$
- C. $x^4 + x^3 + 1$
- D. $x^4 + x^2 + 1$

12. If the data segment 10101110 is transmitted using a 3-bit CRC with a generator polynomial of $x^3 + x^2 + 1$, what is the checksum that is appended to the data segment?

- A. 110
- B. 011
- C. 101
- D. 001

13. What is the main purpose of the cyclic redundancy check (CRC)?

- A. To ensure that data is not lost during transmission
- B. To detect errors in transmitted data
- C. To correct errors in transmitted data
- D. To improve the throughput of the communication channel

14. Which of the following uses a parity bit to detect errors in data transmission?

- A. CRC
- B. Hamming code
- C. Checksum
- D. None of the above

15. What is the advantage of Hamming code over other error detection and correction techniques?

- A. It is simpler to implement
- B. It detects and corrects more errors
- C. It has lower overhead
- D. It works for any size of data

16. Which of the following is true about checksum?

- A. It can detect all errors in data transmission
- B. It can detect some errors in data transmission
- C. It can correct errors in data transmission
- D. It is used to improve the throughput of the communication channel

17. Which of the following is a disadvantage of the cyclic redundancy check (CRC)?

- A. It requires a lot of processing power
- B. It cannot detect errors in data transmission
- C. It can only detect errors, not correct them
- D. It is too complex to implement

18. Which of the following is a characteristic of Hamming code?

- A. It is used to detect errors in data transmission
- B. It can correct one-bit errors and detect two-bit errors
- C. It can correct two-bit errors and detect three-bit errors
- D. It can correct three-bit errors and detect four-bit errors

19. What is the purpose of the checksum in data transmission?

- A. To improve the throughput of the communication channel
- B. To detect errors in transmitted data
- C. To correct errors in transmitted data
- D. To ensure that data is not lost during transmission

20. What is the difference between checksum and CRC?

- A. Checksum uses a polynomial to detect errors, while CRC uses a division algorithm
- B. Checksum can detect and correct errors, while CRC can only detect errors
- C. CRC is more complex to implement than checksum
- D. Checksum is more commonly used in high-speed networks than CRC

21. Which of the following is an advantage of the cyclic redundancy check (CRC)?

- A. It can detect all errors in data transmission
- B. It has lower overhead than other error detection and correction techniques
- C. It is simpler to implement than other error detection and correction techniques

D. It can detect errors in data transmission with a high probability

22. Which of the following is true about Hamming code?

- A. It can detect and correct one-bit errors
- B. It can detect and correct two-bit errors
- C. It can detect and correct three-bit errors
- D. It can detect and correct four-bit errors

23. Which of the following data link control protocols uses cumulative acknowledgments?

- A) Stop-and-wait ARQ
- B) Go-back-N ARQ
- C) Selective repeat ARQ
- D) None of the above

24. In Go-back-N ARQ, what happens when an ACK or NAK is lost?

- A) All the frames after the lost ACK/NAK are retransmitted
- B) Only the lost frame is retransmitted
- C) The entire window is retransmitted
- D) The transmission is terminated

25. Which of the following data link control protocols is known for its low overhead and high throughput?

- A) Stop-and-wait ARQ
- B) Go-back-N ARQ
- C) Selective repeat ARQ
- D) All of the above

26. In stop-and-wait ARQ, what happens if the sender receives a NAK instead of an ACK?

- A) The sender continues to transmit the next frame
- B) The sender retransmits the current frame
- C) The sender terminates the transmission
- D) None of the above

27. Which of the following data link control protocols uses a sliding window approach?

- A) Stop-and-wait ARQ
- B) Go-back-N ARQ
- C) Selective repeat ARQ
- D) None of the above

28. What is the maximum number of unacknowledged frames in the sender's window in Go-back-N ARQ with a window size of 7?

- A) 7
- B) 8
- C) 14
- D) 15

29. Which of the following is true about stop-and-wait ARQ?

- A) It has a higher overhead than Go-back-N ARQ and selective repeat ARQ

- B) It has a higher throughput than Go-back-N ARQ and selective repeat ARQ
- C) It is more reliable than Go-back-N ARQ and selective repeat ARQ
- D) None of the above

30. In selective repeat ARQ, what happens if a frame is received out of order at the receiver?

- A) The receiver discards the out-of-order frame
- B) The receiver buffers the out-of-order frame and sends a NAK for the missing frame
- C) The receiver buffers the out-of-order frame and waits for the missing frame to arrive
- D) The receiver terminates the transmission

31. Which of the following data link control protocols uses a selective repeat approach for retransmissions?

- A) Stop-and-wait ARQ
- B) Go-back-N ARQ
- C) Selective repeat ARQ
- D) None of the above

32. What is the main disadvantage of stop-and-wait ARQ?

- A) It has a low throughput
- B) It has a high overhead
- C) It is less reliable than other ARQ protocols
- D) None of the above

33. A sender using stop-and-wait ARQ protocol sends a 500-byte frame to a receiver. The frame propagation time is 20 ms, and the transmission time is 100 μ s. The round-trip time (RTT) is:

- A. 100 μ s
- B. 200 μ s
- C. 20.1 ms
- D. 20.2 ms

34. In the Go-Back-N ARQ protocol, the sender window size is 5, and the receiver sends an acknowledgment for every 3rd packet. What is the maximum number of packets that the sender can transmit without receiving an acknowledgment?

- A. 2
- B. 3
- C. 4
- D. 5

35. In the selective repeat ARQ protocol, the sender window size is 8, and the receiver window size is 10. The sender sends packets 1 to 12, and the receiver receives packets 1 to 8 and 10 to 12. What is the next packet number that the receiver is expecting?

- A. 9
- B. 11
- C. 13
- D. 14

36. In stop-and-wait ARQ protocol, the propagation delay is 10 ms and the transmission time for a frame is 1 ms. If the receiver detects an error in the received frame, it sends a negative

acknowledgement (NAK) immediately. The sender receives the NAK after the propagation delay and retransmits the frame. What is the total time required for the sender to receive an acknowledgement for a frame that is transmitted correctly?

- A. 10 ms
- B. 11 ms
- C. 12 ms
- D. 13 ms

37. In the Go-Back-N ARQ protocol, the sender window size is 4, and the receiver sends an acknowledgment for every 2nd packet. If the sender sends packets 1 to 10 and all packets are received correctly, what is the total number of packets transmitted?

- A. 12
- B. 14
- C. 16
- D. 18

38. A Go-Back-N ARQ system uses a window size of 5 and a frame size of 1000 bits. If the round-trip time is 50 ms and the bandwidth is 1 Mbps, what is the efficiency of the protocol?

- a) 0.8
- b) 0.7
- c) 0.6
- d) 0.5

39. In a selective repeat ARQ system, a sender uses a window size of 8 and sends frames numbered from 0 to 15. The receiver has received frames 0, 1, 2, 3, 4, and 5 correctly. If the receiver receives a frame with the sequence number 9, what is the receiver's response?

- a) Acknowledge frames 6, 7, and 8
- b) Acknowledge frames 6 and 7
- c) Acknowledge frames 6, 7, 8, and 10
- d) Discard the frame with the sequence number 9

40. In a pure ALOHA network with a bandwidth of 1 Mbps, what is the maximum number of 1000-bit frames that can be transmitted per second if the average station generates 2 frames per second?

- a) 50
- b) 40
- c) 30
- d) 20

41. In a slotted ALOHA network with 20 stations, each transmitting a 1000-bit frame every 5th slot, what is the maximum throughput?

- a) 0.052
- b) 0.067
- c) 0.08
- d) 0.1

42. In a CSMA network with a bandwidth of 10 Mbps, a propagation delay of 100 microseconds, and a frame size of 1500 bytes, what is the minimum size of the inter-frame gap (IFG) needed to avoid collisions?

- a) 12.8 microseconds
- b) 13.3 microseconds
- c) 13.8 microseconds
- d) 14.3 microseconds

43. In a CSMA/CD network with a 10 Mbps bandwidth and a propagation delay of 100 microseconds, what is the minimum frame size required to ensure that a station can detect a collision before completing the transmission of a frame?

- a) 128 bytes
- b) 256 bytes
- c) 512 bytes
- d) 1024 bytes

44. In pure ALOHA, the channel capacity is 100 Kbps, and each station sends a frame of 1000 bits. If the system has 1000 stations and each station generates a frame in a random time slot, what is the maximum number of frames that can be sent per second?

- A. 250 frames
- B. 500 frames
- C. 750 frames
- D. 1000 frames

45. In Slotted ALOHA, the channel capacity is 1 Mbps, and each station sends a frame of 2000 bits. If the system has 20 stations and each station generates a frame in each time slot with probability p , what is the maximum value of p for which the system will operate efficiently?

- A. 0.1
- B. 0.2
- C. 0.3
- D. 0.4

46. In CSMA/CD, the round trip time between two stations is 50 microseconds, and the minimum frame size is 512 bits. What is the minimum distance between two stations to ensure that a collision is detected before the end of the frame?

- A. 400 meters
- B. 800 meters
- C. 1000 meters
- D. 2000 meters

47. In CSMA/CA, the contention window is set to 7 slots. If a station fails to receive an acknowledgement after the first transmission attempt, it doubles the contention window and makes a second attempt. What is the probability that a station successfully transmits a packet on the fourth attempt?

- A. 0.011
- B. 0.044
- C. 0.121
- D. 0.168

48. In CSMA/CD, the round trip time between two stations is 20 microseconds, and the maximum frame size is 1024 bits. What is the maximum propagation delay for a cable that is 500 meters long?

- A. 1.25 microseconds
- B. 2.5 microseconds
- C. 5 microseconds
- D. 10 microseconds

49. In pure ALOHA, if 40% of the slots are occupied by the stations, what is the channel utilization?

- A. 0.10
- B. 0.20
- C. 0.30
- D. 0.40

50. In Slotted ALOHA, if 20 stations are each attempting to transmit a frame with a probability of 0.1 in each time slot, what is the probability that there will be no successful transmissions in a given time slot?

- A. 0.012
- B. 0.179
- C. 0.271
- D. 0.512

51. In CSMA, if the collision probability is 0.1, what is the maximum number of stations that can be supported on a 10 Mbps channel, assuming that the stations transmit frames of 1000 bits?

- A. 7
- B. 10
- C. 20
- D. 50

52. In CSMA/CD, if the channel capacity is 100 Mbps, the round trip time is 50 microseconds, and the maximum frame size is 1024 bits, what is the minimum distance between two stations to ensure that a collision is detected before the end of the frame?

- A. 200 meters
- B. 400 meters
- C. 500 meters
- D. 1000 meters

53. In which protocol, a station checks for the availability of the medium before transmitting a frame?

- A. ALOHA
- B. Slotted ALOHA
- C. CSMA
- D. CSMA/CD
- E. CSMA/CA

54. In Slotted ALOHA, what is the probability that a station will succeed in transmitting a frame in the first slot?

- A. $1/e$
- B. $1/2e$
- C. $e/2$
- D. e
- E. $2e$

55. In CSMA, what is the maximum frame size that can be transmitted if the propagation delay is $100\ \mu\text{s}$ and the data rate is 10 Mbps?

- A. 1000 bits
- B. 1500 bits
- C. 2000 bits
- D. 2500 bits
- E. 3000 bits

56. In CSMA/CD, what is the minimum frame size required for a 10 Mbps network with a maximum cable length of 2500 meters and a propagation speed of $200\ \text{m}/\mu\text{s}$?

- A. 256 bits
- B. 512 bits
- C. 1024 bits
- D. 2048 bits
- E. 4096 bits

57. In CSMA/CA, what is the purpose of the Network Allocation Vector (NAV)?

- A. To reserve the medium for a particular station
- B. To specify the maximum frame size that can be transmitted
- C. To indicate the type of frame being transmitted
- D. To provide a countdown timer for the duration of the transmission
- E. To indicate the amount of bandwidth available on the medium

58. A network uses CSMA/CD with a data rate of 100 Mbps and a cable length of 2 km. The propagation speed is $2 \times 10^8\ \text{m/s}$. What is the round-trip time?

- A. $20\ \mu\text{s}$
- B. $40\ \mu\text{s}$
- C. $50\ \mu\text{s}$
- D. $100\ \mu\text{s}$
- E. $200\ \mu\text{s}$

59. A network uses ALOHA with a data rate of 10 Mbps. If the average number of frames transmitted per second is 2000, what is the average number of collisions per second?

- A. 1000
- B. 1500
- C. 2000
- D. 2500
- E. 3000

60. A network uses Slotted ALOHA with a data rate of 1 Mbps. If the average number of frames transmitted per second is 50, what is the maximum throughput?

- A. 0.25 Mbps
- B. 0.5 Mbps
- C. 0.75 Mbps
- D. 1 Mbps
- E. 1.25 Mbps

Answer

1. B	2. D	3. B	4. B	5. A	6. C	7. C	8. B	9. C	10. B
11. B	12. A	13. B	14. B	15. B	16. B	17. C	18. B	19. B	20. A
21. D	22. A	23. B	24. A	25. C	26. B	27. B	28. B	29. A	30. B
31. C	32. A	33. D	34. C	35. B	36. C	37. B	38. A	39. B	40. D
41. A	42. B	43. D	44.	45.	46.	47.	48.	49.	50.
51.	52.	53.	54.	55.	56.	57.	58.	59.	60.