EEEN 464 – DIGITAL COMMUNICATION

LINE CODING – TEST YOUR KNOWLEDGE

I. FUNDAMENTALS

1. **Line coding converts _____ into signals for transmission.**
   a) Analog audio
   b) Digital bits
   c) Text messages
   d) Radio waves

2. **The purpose of line coding includes .....**
   a) Increasing signal power
   b) Synchronizing sender/receiver
   c) Encrypting data
   d) Compressing files

3. **A "symbol" in line coding represents .....**
   a) A single voltage level
   b) One or more bits
   c) An error-checking code
   d) A clock cycle

4. **True/False: Line coding reduces the need for external synchronization.**
   a) True
   b) False

5. **Which is NOT a key characteristic of line codes?**
   a) Polarity
   b) Bandwidth
   c) Encryption strength
   d) DC component

II. CHARACTERISTICS & PROPERTIES

6. **Unipolar encoding uses _____ voltage level(s).**
   a) One
   b) Two
   c) Three
   d) Zero

7. **Polar schemes use _____ to represent bits.**
   a) Positive and negative voltages
   b) Zero voltage only

c) Light intensity
d) Frequency shifts

8. **Bit rate vs. Baud rate: If 1 symbol = 2 bits, a 1000 baud signal = _____ bit rate.**
   a) 500 bps
   b) 1000 bps
   c) 2000 bps
   d) 4000 bps

9. **A DC component in signals is problematic because it:**
   a) Increases bandwidth
   b) Causes signal drift in transformers
   c) Slows down transmission
   d) Creates noise

10. **Self-clocking codes embed _____ for synchronization.**
    a) Encryption keys
    b) Timing information
    c) Error-correction bits
    d) Voltage spikes

11. **Which scheme has the highest bandwidth requirement?**
    a) NRZ-L
    b) Manchester
    c) AMI
    d) Unipolar NRZ

12. **Noise immunity is best in .....**
    a) Unipolar NRZ
    b) Differential Manchester
    c) RZ
    d) NRZ-I

13. **Bipolar schemes use _____ voltage levels.**
    a) 1
    b) 2
    c) 3
    d) 4

14. **True/False: Manchester coding has no DC component .....**
    a) True
    b) False

15. **Long sequences of zeros cause synchronization loss in .....**
    a) Manchester
    b) AMI
    c) NRZ-I
    d) RZ

III. LINE CODING SCHEMES

16. **In Unipolar NRZ, a binary "1" is represented as .....**
    a) 0V

b) +V
c) –V
d) +V/2

17. **NRZ-I encodes "1" as a ……..**
    a) Fixed +V
    b) Voltage inversion
    c) Zero voltage
    d) Pulse transition

18. **RZ (Return-to-Zero) differs from NRZ because it:**
    a) Uses three voltage levels
    b) Ends each bit at zero voltage
    c) Has no DC component
    d) Both b & c

19. **Manchester coding represents "0" as:**
    a) Low→High transition
    b) High→Low transition
    c) No transition
    d) Zero voltage

20. **Differential Manchester identifies "0" by:**
    a) Mid-bit transition only
    b) Transition at bit start
    c) Fixed +V
    d) No transition at start

21. **In AMI, a binary "1" alternates between ……..**
    a) 0V and +V
    b) +V and –V
    c) +V and 0V
    d) –V and 0V

22. **HDB3 and B8ZS are variants of _____ designed to fix long _____ sequences.**
    a) Manchester / ones
    b) AMI / zeros
    c) NRZ / ones
    d) RZ / zeros

23. **Encode "1010" using Manchester.**
    a) H→L, L→H, H→L, L→H
    b) H→L, H→L, L→H, L→H
    c) L→H, H→L, L→H, H→L
    d) L→H, L→H, H→L, H→L

24. **Encode "1100" using AMI:**
    a) +V, –V, 0V, 0V
    b) +V, +V, 0V, 0V
    c) –V, +V, 0V, 0V
    d) +V, 0V, 0V, –V

25. **Which scheme is used in classic Ethernet?**
    a) NRZ

b) Manchester
c) AMI
d) RZ

IV. COMPARISONS & APPLICATIONS

26. **Best for transformer-coupled links .....**
    a) Unipolar NRZ (high DC)
    b) AMI (no DC)
    c) NRZ-I (low DC)
    d) RZ (medium DC)

27. **Most bandwidth-efficient scheme .....**
    a) RZ
    b) Manchester
    c) NRZ-L
    d) AMI

28. **Self-clocking is critical in .....**
    a) Optical fiber
    b) Wireless networks
    c) Long copper cables
    d) Short-range USB

29. **Error detection is possible in .....**
    a) Unipolar NRZ
    b) Manchester
    c) AMI (via polarity violations)
    d) NRZ-I

30. **Ideal for PDH-carrier (T1) systems .....**
    a) Manchester
    b) AMI/B8ZS
    c) Differential Manchester
    d) RZ

ANSWERS

1. b)
2. b)
3. b)
4. a)
5. c)
6. a)
7. a)
8. c)
9. b)
10. b)
11. b)
12. b)
13. c)
14. a)
15. b)
16. b)
17. b)
18. d)
19. a)
20. b)
21. b)
22. b)
23. c)
24. a)
25. b)
26. b)
27. c)
28. c)
29. c)
30. b)