Chapter 8: The Telephone System

MULTIPLE CHOICE

1. DTMF stands for:
   a. Digital Telephony Multiple Frequency
   b. Dial Tone Master Frequency
   c. Dual-Tone Multifrequency
   d. Digital Trunk Master Frequency
   ANS: C

2. PSTN stands for:
   a. Public Switched Telephone Network
   b. Private Switched Telephone Network
   c. Primary Service Telephone Network
   d. Primary Service Telephone Numbers
   ANS: A

3. POTS stands for:
   a. Private Office Telephone System
   b. Primary Office Telephone Service
   c. Primary Operational Test System
   d. Plain Old Telephone Service
   ANS: D

4. LATA stands for:
   a. Local Access and Transport Area
   b. Local Access Telephone Area
   c. Local Area Telephone Access
   d. Local Area Transport Access
   ANS: A

5. A LATA is:
   a. a local calling area
   b. a type of digital local network
   c. a way of accessing a tandem office
   d. a way of accessing a central office
   ANS: A

6. Central offices are connected by:
   a. local loops
   b. trunk lines
   c. both a and b
   d. none of the above
   ANS: B

7. Local loops terminate at:
   a. a tandem office
   b. a toll station
   c. a central office
   d. an interexchange office
   ANS: C

8. Call blocking:
   a. cannot occur in the public telephone network
   b. occurs on the local loop when there is an electrical power failure
   c. occurs only on long-distance cables
   d. occurs when the central office capacity is exceeded
9. In telephony, POP stands for:
   a. Post Office Protocol  
   b. Point Of Presence  
   c. Power-On Protocol  
   d. none of the above
   ANS: B

10. The cable used for local loops is mainly:
   a. twisted-pair copper wire  
   b. shielded twisted-pair copper wire  
   c. coaxial cable  
   d. fiber-optic
   ANS: A

11. FITL stands for:
   a. Framing Information for Toll Loops  
   b. Fiber In the Toll Loop  
   c. Framing In The Loop  
   d. Fiber-In-The-Loop
   ANS: D

12. Loading coils were used to:
   a. increase the speed of the local loop for digital data  
   b. reduce the attenuation of voice signals  
   c. reduce crosstalk  
   d. provide C-type conditioning to a local loop
   ANS: B

13. DC current flows through a telephone:
   a. when it is on hook  
   b. when it is off hook  
   c. as long as it is attached to a local loop  
   d. only when it is ringing
   ANS: B

14. The range of DC current that flows through a telephone is:
   a. 20 µA to 80 µA  
   b. 200 µA to 800 µA  
   c. 2 mA to 8 mA  
   d. 20 mA to 80 mA
   ANS: D

15. The separation of control functions from signal switching is known as:
   a. step-by-step switching control  
   b. crossbar control  
   c. common control  
   d. ESS
   ANS: C

16. The typical voltage across a telephone when on-hook is:
   a. 48 volts DC  
   b. 48 volts, 20 hertz AC  
   c. 90 volts DC  
   d. 90 volts, 20 hertz AC
   ANS: A

17. The typical voltage needed to "ring" a telephone is:
a. 48 volts DC  
b. 48 volts, 20 hertz AC  
c. 90 volts DC  
d. 90 volts, 20 hertz AC  
ANS:  D

18. The bandwidth of voice-grade signals on a telephone system is restricted in order to:
a. allow lines to be "conditioned"  
b. prevent "singing"  
c. allow signals to be multiplexed  
d. all of the above  
ANS:  C

19. VNL stands for:
a. voltage net loss  
b. volume net loss  
c. via net loss  
d. voice noise level  
ANS:  C

20. Signal loss is designed into a telephone system to:
a. eliminate reflections  
b. prevent oscillation  
c. improve signal-to-noise ratio  
d. reduce power consumption  
ANS:  B

21. The reference noise level for telephony is:
a. 1 mW  
b. 0 dBm  
c. 1 pW  
d. 0 dBr  
ANS:  C

22. The number of voice channels in a basic FDM group is:
a. 6  
b. 12  
c. 24  
d. 60  
ANS:  B

23. Basic FDM groups can be combined into:
a. supergroups  
b. mastergroups  
c. jumbogroups  
d. all of the above  
ANS:  D

24. In telephone system FDM, voice is put on a carrier using:
a. SSB  
b. DSBSC  
c. PDM  
d. PCM  
ANS:  A

25. PABX stands for:
a. Power Amplification Before Transmission  
b. Private Automatic Branch Exchange  
c. Public Automated Branch Exchange  
d. Public Access Branch Exchange  
ANS:  B
26. SLIC stands for:
   a. Single-Line Interface Circuit
   b. Standard Line Interface Card
   c. Subscriber Line Interface Card
   d. Standard Local Interface Circuit

   ANSWER: C

27. In DS-1, bits are "robbed" in order to:
   a. provide synchronization
   b. carry signaling
   c. cancel echoes
   d. check for errors

   ANSWER: B

28. "Bit-stuffing" is more formally called:
   a. compensation
   b. rectification
   c. justification
   d. frame alignment

   ANSWER: C

29. ISDN stands for:
   a. Integrated Services Digital Network
   b. Information Services Digital Network
   c. Integrated Services Data Network
   d. Information Systems Digital Network

   ANSWER: A

30. Basic ISDN has not been widely adopted because:
   a. it took too long to develop
   b. it is too slow
   c. it has been surpassed by newer technologies
   d. all of the above

   ANSWER: D

31. ADSL stands for:
   a. All-Digital Subscriber Line
   b. Asymmetrical Digital Subscriber Line
   c. Allocated Digital Service Line
   d. Access to Data Services Line

   ANSWER: B

32. Compared to ISDN, internet access using ADSL is typically:
   a. much faster
   b. about the same speed
   c. much more expensive
   d. none of the above

   ANSWER: A

COMPLETION

1. A __________________ is a local calling area.

   ANSWER: LATA

2. Central offices are connected together by _________________ lines.
3. One central office can be connected to another through a ________________ office.
   ANS: trunk

4. With 7-digit phone numbers, ________________ thousand telephones can connect to a central office.
   ANS: ten

5. Call ________________ is when it becomes impossible for a subscriber to place a call due to an overload of lines being used.
   ANS: blocking

6. New ________________ switching equipment uses TDM to combine signals.
   ANS: digital

7. Most local loops still use ________________ copper wire.
   ANS: twisted-pair

8. As compared to a hierarchical network, a ________________ network never needs more than one intermediate switch.
   ANS: flat

9. ________________ coils were used to reduce the attenuation of voice frequencies.
   ANS: Loading

10. In a twisted-pair telephone cable, the red wire is called ________________.
    ANS: ring

11. In a twisted-pair telephone cable, the green wire is called ________________.
    ANS: tip

12. Of the red and green 'phone wires, the ________________ wire is positive with respect to the other.
    ANS: green

13. A telephone is said to have ________________ the line when the central office sends it dial tone.
    ANS: seized

14. The ________________ functions are provided by a SLIC.
ANS: BORSCHT

15. A ____________________ coil prevents loss of signal energy within a telephone while allowing full-duplex operation over a single pair of wires.
   ANS: hybrid

16. In a crosspoint switch, not all _________________ can be in use at the same time.
   ANS: lines

17. The old carbon transmitters generated a relatively _________________ signal voltage.
   ANS: large

18. The generic term for Touch-Tone® signaling is _________________.
   ANS: DTMF

19. A _________________ line provides more bandwidth than a standard line.
   ANS: conditioned

20. In the telephone system, amplifiers are called _________________.
   ANS: repeaters

21. An echo _________________ converts a long-distance line from full-duplex to half-duplex operation.
   ANS: suppressor

22. _________________ weighting is an attempt to adjust the noise or signal level to the response of a typical telephone receiver.
   ANS: C-message

23. In FDM telephony, the modulation is usually _________________.
   ANS: SSB
   SSBSC

24. In FDM telephony, _________________ bands separate the channels in a group.
   ANS: guard

25. Because of "bit robbing", a channel in a DS-1 frame allows only _________________ kbps when used to send digital data.
   ANS: 56
26. A ____________________ is a group of 12 DS-1 frames with signaling information in the sixth and twelfth frames.
ANS: superframe

27. In DS-1C, ________________ bits are used to compensate for differences between clock rates.
ANS: stuff

28. Busy and dial tone are referred to as ________________ signals because they use the same pair of wires as the voice signal.
ANS: in-channel

29. SS7 is the current version of ________________ signaling.
ANS: common-channel

30. SS7 is a ________________-switched data network.
ANS: packet

31. In ISDN, the ________________ channel is used for common-channel signaling.
ANS: D

32. In ISDN, the ________________ channels are used for voice or data.
ANS: B

33. Terminal equipment especially designed for ISDN is designated ________________ equipment.
ANS: TE1

34. The A in ADSL stands for ________________.
ANS: asymmetrical

35. In ADSL, the speed from the network to the subscriber is ________________ than the speed in the opposite direction.
ANS: greater
faster

SHORT ANSWER

1. For a certain telephone, the DC loop voltage is 48 V on hook and 8 V off hook. If the loop current is 40 mA, what is the DC resistance of the local loop?
ANS:
1000 ohms

2. For a certain telephone, the DC loop voltage is 48 V on hook and 8 V off hook. If the loop current is 40 mA, what is the DC resistance of the telephone?

ANS:
200 ohms

3. Which two DTMF tones correspond to the digit "1"? (Use the table in the text.)

ANS:
697 Hz and 1209 Hz

4. Calculate the dB of VNL required for a channel with a 3 ms delay.

ANS:
1 dB

5. If a telephone voice signal has a level of 0 dBm, what is its level in dBrn?

ANS:
90 dBrn

6. A telephone test-tone has a level of 80 dBrn at a point where the level is +5 dB TLP. If C-weighting produces a 10-dB loss, what would the signal level be in dBnc0?

ANS:
65 dBnc TLP