FVDC Worksheet

Chapter 3 – Signals and Wires

1. Define the following terms and the abbreviations for each:
   a. Current flow of charged particles from areas of high concentration to low concentration measured in amps
   b. Power P=IV, measured in watts, "rate with a large flow coupled with a large voltage" how fast work is done
   c. Impedance combines resistance, inductance, and capacitance total opposition to current
   d. Ampere measure of current, the volume of electricity
   e. Ohms measure of resistance, opposition to current
   f. Decibels ratio between two sources of power, the ratio is a measure of power at front link to end link
   g. Voltage electromotive force, measured in volts, push or pull on electrons
   h. Resistance resistance of a wire, measure of opposition to current
   i. Direct Current current flows one way from negative to positive, causes corrosion, batteries are DC
   j. Alternating Current current flows both ways, light sockets are AC, alternates 60hz

2. Fill in the following chart regarding cables:

Cable Type	Cable Length	Connectors	Speed
10Base2 coaxial	185 m	BNC	10 Mbps
10Base5 coaxial	500 m	BNC	10 Mbps
10BaseT UTP	100 m	RJ-45	10 Mbps
100Base-TX (Fast Ethernet) UTP	100 m	RJ-45	100 Mbps
Fiber-optic multimode single	2000 m - multimode 1000 m - single	SC - multimode ST - single	1000 Mbps

3. What are the 3 types of signal transmission and give a brief definition of each:
   1. electrical signal - transmitted over metal wire
   2. optical signal - transmitted by light over fiber optic cable
   3. wireless signal - transmitted by radio or microwaves through the air
4. What is crosstalk? when signals on one wire leak into adjacent wires
5. What is NEXT? near end crosstalk, when crosstalk happens at point close connector attaches to the wire
6. What is electromagnetic interference and radio frequency interference? EMI - interference from electrical wires, RFI - interference from radio frequencies
7. Define the following terms:
   a. Reflection light bounces back at equal angle
   b. Dispersion scattering and broadening of light signals along the length of the fiber, impurities in the fiber cause this
   c. Absorption the absorption of photons by a material
   d. Refraction change of direction of a beam of light when it enters another medium at an angle
8. What is the current if resistance = 150 ohms, and voltage = 150 volts? 1 amp
9. What troubleshooting instrument identifies cable failures, measures length, and checks the wiring of cables used for Ethernet LAN systems? cable tester, time domain reflectometer - measures length of cable
10. What device can be used to measure foreign voltage on a communications circuit or to determine if there are opens or shorts in a circuit? This device can also be used to measure AC and DC voltages as well. voltage meter
11. This test set can be used to monitor noise on a telecommunications circuit and can also be used to place and receive phone calls on working telecommunications circuits.
12. This tool allows you to place a tone on a pair of wires and track that tone without metallic contact to the wires of the termination points. pounder, tone generator, tone inductor
13. Why is it important to maintain the twists in twisted pair cabling? To have cancellation of noise
14. How many pairs of wires are there in a Cat5e cable? 4 pairs

15. In electrical signaling, transmission is achieved by means of copper wires between the computers.
16. What is an optical signal? a data signal transmitted by light, on/off - bright/dim
17. Define and describe ISDN. Integrated Services Digital Network - dial-up technology 2 64k B + 2 16K D channels B= data - D= control 138Kbps
18. What is the approximate bandwidth of a T-1 line? 1.544 Mbps
19. What is the standard fiber-optic networking for optical networking using a ring topology, and is used for extremely high bandwidth applications? FDDI (fiber distributed data interface)
20. What is the networking protocol that defines a uniform packet size of 53 bytes and allows the inter-mixing of various services such as voice, video and data? ATM (Asynchronous Transfer Mode)
21. Is it true that if a wire is positioned too close to sources of electrical noise or radio noise it may act as an antenna and will introduce stray signals? yes
22. How is attenuation measured? decibels
23. Draw a picture of a clean digital signal.

24. Draw a picture of an analog signal.

25. Other losses on network cabling can include the following. Give a brief definition of each.
    a. Fiber-optic losses absorption and reflection can diminish the light signal
    b. Coupling losses if the two wires are not connected, connected together, loss will happen
    c. Wireless losses the further away from the signal source, the less power is received absorption & diffusion
26. What are 4 examples of insulators (electrons flow poorly)? rubber, glass, wood, brick, plastic
27. What are 4 examples of conductors (electrons flow well)? gold, copper, silver, human body, water, steel, iron, aluminum
28. What is electricity? free flow of electrons that flow from a negative terminal to a positive terminal
29. Do negative charges attract positive or negative charges? positive