

# FIBER OPTICS & LASERS eSeries

NAME: \_\_\_\_\_  
Partner: \_\_\_\_\_  
Period: \_\_\_\_\_  
Rotation: \_\_\_\_\_

MODULE GRADE: COURSE GR. \_\_\_\_\_  
POST TEST \_\_\_\_\_

MODULE AVE.= \_\_\_\_\_

FIBER OPTICS & LASERS “WORKSHEET”

WORKSHEET TOTAL= \_\_\_\_\_

LAB PERFORMANCE: \_\_\_\_\_

(If you are absent, write ABS on the line for the day you miss and **DISCUSS** what you need to make up with the teacher)  
LAB PERFORMANCE TOTAL= \_\_\_\_\_

**Extra Credit**—Discuss this with the instructor before beginning!!!

WORD SEARCH \_\_\_\_\_(5)

“Laser Light Show” \_\_\_\_\_(5)

MODULE REPORT \_\_\_\_\_(5)

MODULE NOTES \_\_\_\_\_(0-10)

CHALLENGES \_\_\_\_\_(5)

Lessons 7, 8, 9, &11 in 12 lesson module \_\_\_\_\_(20)

TOTAL EXTRA CREDIT= \_\_\_\_\_

BONUS POINTS \*\*\* \_\_\_\_\_

## FIBER OPTICS & LASERS “WORKSHEET”

**LESSON 1**-Have the teacher show you how to connect the cables **BEFORE** you start the Experiment! T.I.: \_\_\_\_\_(5)

On the line below, write your name (first and last) then put it into Morse Code:

\_\_\_\_\_. (5)

**LESSON 2**- Explain the experiment below. Use another sheet of notebook to finish your answer if needed.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_. (10)

Explain this experiment to the teacher.

T.I.: \_\_\_\_\_(5)

**LESSON 3**-Leave both experiments and the equipment set up so you can explain them to the instructor.

**Demonstrate Experiment 2** to the instructor: Say “Hello and your partners name” in to the microphone.

**Explain both Part 1 & 2** to the instructor.

T.I.: \_\_\_\_\_(10)

**LESSON 4**- You will need to tell how this system works.

Start with: The radio waves are transmitted from the radio station tower, then:...(answer similar to Lesson 3).

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_. (10)

**Impacts**-Write notes from the video clips.

**Impacts Paper:** \_\_\_\_\_(5)

**LESSON 7-Part 1:** Explain what happened where you shined the laser light through the powder (chalk dust)?

**Part 2:** Explain what happened when you shined the laser through the water (both with and without bubbles).

**Part 3:** Explain what happened when you shined the light through the black plastic cable.

**Part 4:** Explain what you saw when you shined the laser light through each of the two solid rods.

(10)

**LESSON 7: CAREER REPORT.**

Career Guidance Report-  
STUDY GUIDE-Turned In

C.G. NOTES: \_\_\_\_ (10)

Study Guide: \_\_\_\_ (5)

Worksheet Total: \_\_\_\_\_

**These lessons are in the twelve lesson module for Fiber Optics and Lasers. see the teacher**

**LESSON 7 (of 12 lessons)-** Attenuation and Bending Loss:

Attenuation Experiment(explain): \_\_\_\_\_

**Bending Loss Experiment 1:** Explain what happened On the line below?

**Bending Loss Experiment 2:** Explain what you saw when you shined the laser light through each of the two rods?

(5)

**LESSON 8-Reflection & Refraction Water Experiment.**

Write what you **did** and what you **learned** in the cup and water experiments. Relate answer to reflection & refraction.

**LESSON 9- Optical Repeaters.** Explain the Experiment to the teacher.

(5)

**LESSON 11-**Write what happens when you drop the straws into the cup with the rubber band?

(5)

What kind of light does this represent and **why**?

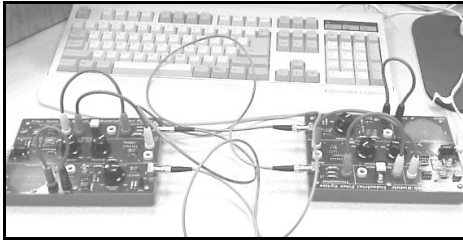
Write what happens to the straws into the cup without the rubber band?

What kind of light does this represent and **why**?

What is another name for Laser light? \_\_\_\_\_.

What is another name for Ordinary light? \_\_\_\_\_.

(5)



# Fiber Optics & Lasers Study Guide for Post Test

These are NOT the exact questions on the Post Test!!

- Many years ago, Morse Code was used extensively as a means of communication on \_\_\_\_\_.  
farms      railroads and ships      the prairie      All of the above are correct.
- Morse Code uses \_\_\_\_\_ to represent the letters of the alphabet and other symbols.  
stick figures      basic drawings      1's and 0's      dots and dashes
- If data is sent as a continuous series of on and off states, it is called being sent \_\_\_\_\_.  
serially      logically      secretly      rapidly
- One of the most common computer codes is \_\_\_\_\_.  
ASCII      Morse Code      Pascal      None of the above is correct.
- Light traveling through an optical fiber \_\_\_\_\_ weaken with distance as quickly as sound does when traveling through the air.  
does not      does      sometimes      usually
- When a person speaks, his or her voice travels at a speed of about \_\_\_\_\_, the speed of sound through air at room temperature.  
55 miles per hour      346 meters per second      34 meters per second      300 million meters per second
- The two most commonly used methods of converting sound waves to radio waves are \_\_\_\_\_.  
LED and laser      wavelength and frequency      AM and FM      analog and digital
- The process of converting sound waves to radio waves is called \_\_\_\_\_.  
broadcasting      transmitting      modulation      handshaking
- The connection between fiber optics, lasers, and the frequency spectrum all come down to one thing: \_\_\_\_\_.  
the FCC      electricity      broadcasting      light
- When discussing wavelength, the number of waves passing a given distance in one second is the \_\_\_\_\_ of the wave.  
amplitude      electric current      speed      frequency
- Optical fiber is the transmission \_\_\_\_\_ that carries an optical signal.  
method      medium      guide      route
- During the laydown phase of manufacturing optical fiber, the core and the cladding glasses are vapor-deposited to form a(n) \_\_\_\_\_.  
rod      preform      optical fiber      coating
- The highly transparent glass of the \_\_\_\_\_ is the part of the fiber through which the light travels.  
core      cladding      coating      reflectors

14. The loss of light intensity due to bending of the cable in a fiber optic system is called

\_\_\_\_\_.  
attenuation      curvature      bending loss      scattering

15. When signals are lost due to long distances the light must travel, \_\_\_\_\_ are sometimes used to overcome the losses.

optical repeaters      reinforced fibers      interceptors      None of the above is correct.

16. There are two main descriptions of light and what it consists of. The two theories are about

\_\_\_\_\_.  
straight lines and curves      waves and particles      reflection and refraction      Xs and Ys

17. Refraction occurs when light \_\_\_\_\_.

bends      passes from air into water      passes from water into air      All of the above are correct.

18. What controls the signal's strength on your optics trainers?

the momentary switch      the receiver gain      the signal generator      None of the above is correct.

19. Attenuation, or loss of signal strength, causes \_\_\_\_\_ signals.

weakened      strong      fast      reflected

20. Light cannot enter or exit a fiber properly if the end of the fiber is not \_\_\_\_\_.

open      sealed      cut squarely at a right angle      All of the above are correct.

21. The \_\_\_\_\_ of the ends of a plastic or glass optical fiber determine how well light can enter or exit the fiber.

physical properties      color      cladding      All of the above are correct.

22. Ordinary white light is \_\_\_\_\_, meaning it spreads out with distance.

collimated      divergent      coherent      monochromatic

23. Light that travels in one direction in a straight line is said to be:

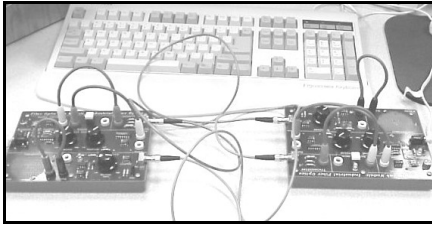
collimated      divergent      coherent      monochromatic

24. The world's first working laser used a three-inch-long synthetic \_\_\_\_\_ with a photographic flash bulb as the energy.

ruby crystal      sapphire crystal      plastic cylinder      glass crystal

25. There are essentially \_\_\_\_\_ parts to a laser.

two      three      four      five



# Fiber Optics & Lasers

## 6.0

1. In 1844, Morse Code was invented by (1- MORSE CODE TRANSMISSION).  
Thomas Edison - Samuel Morse - Albert Einstein - Thomas Bell
2. Morse Code works by using groups of (1- MORSE CODE TRANSMISSION) to represent the alphabet and numbers. **words - symbols - dots and dashes - configurations**
3. Morse Code can be transmitted by sound and via (1- MORSE CODE TRANSMISSION).  
**light - horse - auto - pigeon**
4. The characters for the letter M in Morse Code are (1- MORSE CODE TRANSMISSION).  
.. \_ \_
5. Morse Code differentiates between dots and dashes by (1- MORSE CODE TRANSMISSION EXPERIMENT) the character is held.  
*the length of time at which - the size of which - the position at which - how loud*
6. Using (2- DATA TRANSMISSION), computers and digital equipment exchange information.  
**Morse Code - digital data - typewriters - satellites**
7. Data is sent in a continuous string of on and off states call logical (2- DATA TRANSMISSION).  
**(logical) highs and (logical) lows - dots and dashes - yes's and no's - bits and bytes**
8. (2- DATA TRANSMISSION) are devices that communicate with each other by transmitting and receiving data. **Oscilloscopes - Transmitters - Transceivers - Scramblers**
9. In order to (2- DATA TRANSMISSION) that the correct data has been received, computers require transceivers. **accelerate - pretend - be skeptical that - acknowledge**
10. A transceiver performing acknowledgement operations at the originating & receiving stations is known as (2- DATA TRANSMISSION).  
**redundant operation - handshaking - double operation - multiple operation**
11. (3- VOICE TRANSMISSION) is the speed of sound in air at room temperature.  
**3.46 meters/second - 346 feet/minute - 346 meters/second - 346 yards/second**
12. Using fiber optics for voice transmissions increases the speed over sound by (3- VOICE TRANSMISSION) times. **900 - 90 - 9000 - 900,000**
13. Light traveling trough an optical fiber (3-VOICE TRANSMISSION) weaken(s) with distance as quickly as sound does when traveling through the air.  
**Does not - does - sometimes - usually**
14. Fiber Optic voice transmissions maintain their sound level over great distances by using (3- VOICE TRANSMISSION).  
**transceivers - relays - antennas - amplifiers**
15. Using the Fiber Optics Lab Module, you adjust the listening level by increasing or decreasing the volume with the (3- VOICE TRANSMISSION EXPERIMENT 1).  
**Receiver Gain knob - AC adapter - Signal Generator - Transmitter**

16. All sounds heard by humans fall within the frequency range of (4- RADIO TRANSMISSION) .  
*200 to 200,000 hertz - 20 to 20,000 hertz - 20 to 20,000 amps - 2000 to 20,000 volts*
17. (4- RADIO TRANSMISSION) is the process of converting sound waves to radio waves.  
*Frequency - Cycles - Transmitting - Modulation*
18. A(n) (4- RADIO TRANSMISSION) is a unit of measure for frequency consisting of a wave or cycle per second. *volt - amp - hertz - ohm*
19. AM and FM are the two most common methods of modulation. These letters stand for (4- RADIO TRANSMISSION). *aerial and fixed modulation - amplitude and frequency modulation - adjust and fine modulation - astro and fueled modulation*
20. The conversion of light energy to electrical energy is accomplished by the use of (5- USE OF LIGHT BY FIBER OPTICS & LASERS) in the Fiber Optics Lab Module's Receiver.  
*infrared detectors - transformers - optical sensors - relays*
21. Light is made up of (5- USE OF LIGHT BY FIBER OPTICS & LASERS) with many characteristics that cannot be seen with the human eye.  
*molecules - chemicals - electronic beams - electromagnetic waves*
22. (5- USE OF LIGHT BY FIBER OPTICS & LASERS) has to do with bending of light.  
*Refraction - Reflection - Particle - None of the above*
23. An example of light transmitted by fiber optics that the eye cannot see is infrared light; another example is (5- USE OF LIGHT BY FIBER OPTICS & LASERS) .  
*moon light - star light - sun light - ultraviolet light*
24. (6- LASER LIGHT) is an acronym for Light Amplification by Stimulated Emission of Radiation.  
*Laser - Lumbar - Lunar - LRB*
25. Einstein confirmed Newton's theory that light can be seen as a series of particles or waves. Einstein called these particle/waves (6- LASER LIGHT) .  
*molecules - atoms - photons - protons*
26. Laser light differs from ordinary light in that it travels in one direction and does not spread out. These characteristics are known as (6- LASER LIGHT) .  
*directional and close - coherent and collimated - polar and intricate - directional and condensed*
27. Laser light is more intense than ordinary light and is one solid color. This latter characteristic is called (6- LASER LIGHT) .  
*universal - unichromatic - monochlor - monochromatic*
28. The three main parts of a laser are the power source, an amplifying medium, and a (7- LASER) .  
*reflector - photon - feedback mechanism - transformer*
29. Current energizes atoms, which releases photons that pass through a mirror and produce (7- LASER) .  
*electric power - vibrations - sound waves - laser light*
30. Modern day applications for lasers include (7- LASER) .  
*surgery - cutting metal - holograms - all of the answers*

# Fiber Optics

M Y A I P R N R W L T S O R D L W T D  
O C N S F M O C R T A R S C A F N A C  
D N T H T H I D Q O I S A S C E T I N  
U E E A K S T X R Z F O E N G B T B C  
L U N I R J A E C O N V E R S A I O N  
A Q N R L O C C O M G M E U M M L S M  
T E A D V E I Q D V I V W O R L I H S  
I R B Q I A F D Z A I C R D I C Y T J  
O F R V U H I I U D O H R M A D E Z Y  
N E E D D M L K I A C R A O N C D T F  
L A N G I S P W Y O J T B U P I G R T  
K F B I C F M Y N E E F O G Z H T E P  
R B Y C E R A O R D F S J C X H O H B  
K W Z K E M M E D U T I L P M A X N T  
I N T E N S I T Y C W A V E S A K B E

AIR  
AMPLIFICATION  
AMPLITUDE  
ANTENNA  
AUDIO  
BROADCAST  
CONVERSAION

DIVERGENT  
COLLIMATED  
FREQUENCY  
HERTZ  
INTENSITY  
LASER  
MICROPHONE

MODULATION  
MONOCHROMATIC  
RECEIVE  
SIGNAL  
SOUND  
TRANSMIT  
WAVES

