

EC 2402 - OPTICAL COMMUNICATION AND NETWORKING

QUESTION BANK

UNIT I

1. Define a fiber-optic system?

Fiber optic system is nothing but a fiber optic cable is essentially light pipe that is used to carry a light beam from one place to another.

2. What is the relationship between information capacity and bandwidth?

Information capacity is directly proportional to bandwidth.

3. Contrast glass and plastic fiber cables?

Fiber optic cables are made from glass and plastic. Glass has lowest loss but it is brittle. Plastic is cheaper but more flexible, but has high attenuation.

4. Define wavelengths.

It is the length that one cycle of an electromagnetic wave occupies in space.

5. For a low power optical signal which type of photo diode can be used? Why?

Avalanche photo diode is used since it has a greater sensitivity owing to internal gain mechanism.

6. Define wavefront.

For plane waves some constant phase points from a surface which is referred as wavefront.

7. What is meant by refractive index of a material?

The refractive index n is defined as the ratio of the velocity of light in a vacuum to the velocity of light in the medium.

8. What is external reflection?

When light is travelling in a certain medium is reflected off an optical denser material (one with a higher refractive index), the process is referred to as external reflection.

9. What is internal reflection?

When light is travelling in a certain medium is reflected off an less optical dense material the process is referred to as internal reflection.

10. Explain guided mode.

Guided mode is a pattern of electric and magnet field distributions that is repeated along the fiber at equal intervals.

11. What is the purpose of cladding?

Cladding provides mechanical strength, reduces scattering loss resulting from dielectric discontinuities at the core surface, and protects the core from absorbing surface contaminants with which it could come into contact.

12. What types of fibers are used commonly?

i) Based on refractive index profile:

a) step Index

b). Graded index

ii). Based on Propagation

a). Mono-mode or single mode.

b). Multi mode.

13. What is a step index fiber? (NOV/DEC 2011)

The refractive index of the core n_1 is constant and a cladding of lower refractive index n_2 is known as step index fiber.

14. What is a Graded index fiber?

The core refractive index decreases continuously with increasing radial distance r from the center of the fiber, but is generally constant in the cladding.

15. What is order of a mode?

It is equal to the number of field zeros across the guide.

16. What is law of refraction? (NOV/DEC 2011)

The law of incidence says that the angle of incidence is equal to the angle of refraction.

17. What is meridional rays?

The ray has an angle of incidence ϕ at the interface which is greater than the critical angle and is reflected at the same angle to the normal.

18. Define Numerical aperture.(MAY/JUNE 2012), (NOV/DEC 2014)

Numerical Aperture is defined as,

$$NA = n_0 \sin \theta_a = (n_1^2 - n_2^2)^{1/2}$$

For air $n_0 = 1$

19. What is skew ray?

Skew rays are not transmitted through the fiber axis. They follow the helical path through the fiber.

20. What are leaky modes in optical fibers?

In leaky modes the fields are confined partially in the fiber core and attenuated as they propagate along the fiber length due to radiation and tunnel effect.

21. Define lower order L_p mode.

The mode having lowest cut off frequency is known as lower order mode.

22. Define acceptance angle. (NOV/DEC 2014)

It is the maximum angle to the axis at which light may enter the fiber in order to be propagated..

23. Define critical angle.

The angle of refraction is always greater than the angle of incidence. Under this condition the refraction and angle of incidence is known as critical angle.

24. What is an index profile?

The index profile of an optical fiber is a graphical representation of the magnitude of the refractive index across the fiber.

25. Write the advantages of optical communication.

- i. Small size and weight.
- ii. Immunity to interference and crosstalk.
- iii. High signal security.