

**B.Sc. ELECTRONICS**  
**Fifth Semester**  
**PHOTONICS AND OPTOELECTRONICS DEVICES**  
**(BSE - 23)**

**Duration: 3Hrs.**

**Full Marks: 70**

Part-A (Objective) =20  
Part-B (Descriptive) =50

**(PART-B: Descriptive)**

**Duration: 2 hrs. 40 mins.**

**Marks: 50**

**Answer any four from Question no. 2 to 6**  
**Question no. 1 is compulsory.**

1. What are the different modes exist in laser operation? Give a comparison in between them. (5+5=10)
2. Explain the operation of a diode laser. How mode locking is done in laser?(5+5=10)
3. Explain the various phases of liquid crystals. (10)
4. What is EDFA? Explain its working principle. (2+8=10)
5. Deduce the field distribution equation at the back focal length of a lens. (3+7=10)
6. Write short notes (*any two*): (5×2=10)
  - a. Pockel's cell
  - b. Q-switching
  - c. Chromatic aberration

\*\*\*\*\*

**B.Sc. ELECTRONICS**  
**Fifth Semester**  
**PHOTONICS AND OPTOELECTRONICS DEVICES**  
**(BSE - 23)**

**Duration: 20 minutes**

**Marks – 20**

**(PART A - Objective Type)**

**I. Tick the correct answer:**

**1×20=20**

1. For a step-index fiber the NA across the core
  - a. varies
  - b. will be opposite
  - c. is constant
  - d. is independent
2. Developed the first laser
  - a. Charles Townes
  - b. Theodore Maiman
  - c. Gordon McKenzie
  - d. Albert Einstein
3. Which color has the shortest wavelength of light?
  - a. Red
  - b. Yellow
  - c. Blue
  - d. Green
4. The core of an optical fiber has a
  - a. Lower refracted index than air.
  - b. Lower refractive index than the cladding.
  - c. Higher refractive index than the cladding.
  - d. Similar refractive index with the cladding.
5. \_\_\_\_\_ is the different angle of entry of light into an optical fiber when the diameter of the core is many times the wavelength of the light transmitted.
  - a. Acceptance angle
  - b. Modes
  - c. Sensors
  - d. Aperture
6. The loss in signal power as light travels down a fiber is called
  - a. Dispersion
  - b. Scattering
  - c. Absorption
  - d. Attenuation
7. \_\_\_\_\_ is the width of the range of wavelengths emitted by the light source
  - a. Bandwidth
  - b. Chromatic Dispersion
  - c. Spectral width
  - d. Beamwidth
8. Fiber optic cables operate at frequencies near
  - a. 20 MHz
  - b. 200 MHz
  - c. 2G Hz
  - d. 800 THz



9. When a beam of light enters one medium from another, which quantity will not change?
- Direction
  - Speed
  - Frequency
  - Wavelength
10. Dispersion is used to describe the
- Splitting of white light into its component colors.
  - Propagation of light in straight lines.
  - Bending of a beam of light when it goes from one medium to another.
  - Bending of a beam light when it strikes a mirror.
11. The wavelength of light has no role in
- Diffraction
  - Interference
  - Polarization
  - Reflection
12. \_\_\_\_\_ is caused by the difference in the propagation times of light rays that take different paths down a fiber.
- Material dispersion
  - Wavelength dispersion
  - Modal dispersion
  - Delay dispersion
13. Photodiodes used as fiber optic detectors are
- Unbiased to generate a voltage same as a solar cell.
  - Forward bias.
  - Reversed bias.
  - Thermoelectrically cooled.
14. What type of fiber has the highest modal dispersion?
- Step-index multimode
  - Graded index multimode
  - Step-index single mode
  - Graded index mode
15. Laser light is \_\_\_\_\_ emission.
- Coherent
  - Stimulated
  - Spontaneous
  - Coherent and stimulated
16. Which type of laser is the simplest to modulate directly by changing its excitation?
- Semiconductor
  - Ruby
  - Helium-neon
  - Neodymium-YAG
17. What is the photon energy for an infrared wave with frequency of  $10^{12}$  Hz?
- $10.6 \times 10^{34}$  joules
  - $6.63 \times 10^{-34}$  joules
  - $6.63 \times 10^{-22}$  joules
  - $10.6 \times 10^{22}$  joules
18. Which of the following factor does not harm laser efficiency?
- Atmospheric absorption.
  - Excitation energy not absorbed.
  - Problems in depopulating the lower laser level.
  - Inefficiency in populating the upper laser level.
19. The numerical aperture of a fiber if the angle of acceptance is 15 degrees, is
- 0.17
  - 0.26
  - 0.50
  - 0.75

20. The term critical angle describes

- a. the point at which light is refracted.
- b. the point at which light becomes invisible.
- c. the point at which light has gone from the refractive mode to the reflective mode.
- d. the point at which light has crossed the boundary layers from one index to another.

\*\*\*\*\*