

**SRM Institute of Science & Technology**

**Faculty of Engineering & Technology**

Ramapuram Campus

**UNIT IV**

**PART A**

1. Digital communication is suitable for

(a) low frequency application

**(b)large bandwidth application**

(c) long distance communication

(d)large wavelength application

2. Induced birefringence is called

(a) magneto optic effect

**(b)electro optic effect**

(c) acousto optic effect

(d)thermal optic effect

3. Kerr effect occurs when …………………………?

(a) electric field is zero

(b) quadratic electro optic coefficient is smaller than linear electro optic coefficient

**(c) quadratic electro optic coefficient is larger than linear electro optic**

**coefficient**

(d)magnetic field is zero.

4. Pockel effect occurs when …………………………?

(a) electric field is zero

**(b)quadratic electro optic coefficient is smaller than linear electro optic**

**coefficient**

(c) quadratic electro optic coefficient is larger than linear electro optic

coefficient

(d)magnetic field is zero.

5. An example for material showing electro optic effect is

(a) germanium

(b) carbon

**(c) Lithium Niobate**

(d)silicon

6. The change in refractive index of a material subjected to a steady

magnetic field is called..........?

(a) coulomb blockade effect

(b) photo emissive effect

(c) electro optic effect

**(d)Magneto optic effect**

7. Optical isolator is required to

**(a)pass light only in one direction.**

(b)isolate the electric field.

(c) isolate magnetic field

(d)split the polarization.

8.The change in refractive index of a medium due to the presence of

sound waves is called

**(a) acousto optic effect**

(b) coulomb blockade effect

(c) photo emissive effect

(d) electro optic effect

9.Doping helps to improve the

(a)stability

(b)resistivity

(c) mobility

**(d)conductivity**

10.Extrinsic semiconductors are

(a)semiconductor in its pure form

**(b)Doped semiconductors.**

(c)semiconductor at fixed temperature

(d)semiconductor at constant pressure

11.Potential barrier in silicon is

(a) 0.3 V

**(b)0.7 V**

(c) 1 V

(d) 0.45 V

12.P-N Junction under forward bias has

**(a) reduced depletion region**

(b)increased depletion region

(c) increased resistivity

(d)increased potential barrier.

13.An example for light source is

(a) APD

**(b)LED**

(c) PIN DIODE

(d)RTD

14.The movement of carriers under the presence of electric field is

(a) diffusion

(b)Diffraction

**(c) drift**

(d) dispersion

15.Current density in a n-type semiconductor depends on

(a) mobility of holes

**(b)mobility of electrons**

(c) magnetic field strength in the semiconductor

(d)polarization in the semiconductor

16.Population inversion is related to

(a) LED

**(b)LASER**

(c) APD

(d)RTD

17. Which are the two main sources of noise in photodiodes without

internal gain?

a) Gaussian noise and dark current noise

b) Internal noise and external noise

**c) Dark current noise & Quantum noise**

d) Gaussian noise and Quantum noise

18. **Optoelectronic device works on \_\_\_\_\_\_\_\_\_\_\_.**

1. light
2. Electrical current
3. **Both light & Electrical**
4. Chemical

19. In a longitudinal electro-optic modulator, half-wave voltage is that voltage which introduces the following phase shift between two polarization components:

(a) /4

(b) /2

**(c)**

(d)

20.In \_\_\_\_\_\_\_\_\_\_\_\_effect the variation in refractive index is proportional to the square of the electric field

1. Pockel
2. **Kerr**
3. Faraday
4. Skin

21.Induced Birefringence in an isotropic crystal by the application of an electric field is called as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Photo emissive effect
2. Acoustic optic effect
3. **Electro-optic effect**
4. Magneto optic effect

22.A uniaxial crystal has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(a) one principal refractive index and no optic axis.

(b) one principal refractive index and one optic axis.

**(c) two principal refractive indices and one optic axis.**

(d) three principal refractive indices and two optic axis

23.The change in the refractive index of a crystal due to the application of an electric field is called as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Photo emissive effect
2. Acoustic optic effect
3. **Electro-optic effect**
4. Magento optic effect

24.In a transverse electro-optic modulator\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(a) Vp is independent of the length l and width d of the modulator crystal.

(b) Vp is dependent on the length l but not on the width d of the crystal.

(c) Vp is dependent on the width d but not on the length l of the crystal.

**(d) Vp is dependent on the ratio d/l**

25.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a device that helps to attain population inversion in optical amplifiers

1. Coupler
2. Attenuator
3. **Pump source**
4. Repeater

**PART B**

1.What is meant by Electro Optic Effect?

2. Define Kerr Effect.

3.State about the Pockels effect.

4.Define Acousto Optic Effect.

5.Discuss about the Birefringence briefly.

6.How longitudinal electro-optic modulator differs from transverse electro-optic modulator?

7.Write a short note about Raman Nath Modulator.

8.Brief about optical amplifiers and its applications.

9.Compare Preamplifiers with Power amplifiers.

10.Derive the expression for optical amplifier gain.

11.Explain about Raman Amplifiers with a neat sketch.

12.Derive the expression for power, efficiency, and gain of erbium doped fiber amplifiers.

13.Write briefly on the types of optical amplifiers

**PART C**

1. Elaborate on the working principle of Longitudinal Electro Optic modulator with a neat sketch.

2. Elaborate on the working principle of Transverse Electro Optic modulator with a neat sketch.

3.Discuss in detail the Acousto Optic Modulator with a neat sketch.

4.Describe the working principle of optical amplifiers in detail.

5.Explain the working principle of Erbium Doped Fiber amplifiers with a neat sketch.

6. Explain the working principle of Semiconductor optical amplifiers with a neat sketch.

7. Elaborate on the working principle of Raman Optical Amplifiers with a neat sketch.

8. Derive the expression for power, efficiency, and gain of Semiconductor optical amplifiers.

9.Describe the amplifier mechanism of Erbium-Doped Fiber amplifiers with corresponding energy level diagrams.

10.Discuss in detail the principle and operation of a photonic switch based on self-electro optic Device (SEED).

11.Explain in detail about Raman Nath (Transmission type) and Bragg modulator(Reflection type)

12.Explain with a neat diagram, the construction and working of electro optic effect based longitudinal electro optic modulator.

13.Explain in detail about the Fiber Raman Amplifier with a neat diagram.

14.Discuss the basic configuration, working principle and gain of Semiconductor optical amplifiers (SOA).