

Important Questions (5-7 Marks)

Unit I

1. Prove that Fermi level in case of Intrinsic Semiconductor lies in between conduction band & valence band. 5
2. Define Band gap energy. Give classification of solids on the basis of band theory of solids. 5
3. What is Hall Effect? Obtain the equation for Hall coefficient and Hall voltage.

Unit II

4. State Compton effect. Derive expression for Compton shift. 7
5. Prove the Heisenberg Uncertainty principle by treating electron as a particle. 5

Unit III

6. Explain construction and working of Bainbridge Mass Spectrograph. 7
7. Draw Block diagram of CRO. Discuss the working of time base generator and trigger circuit. 6
8. Obtain the expression for vertical deflection of an electron on the fluorescent screen, when it moves through transverse electric field. 5
9. Find the deflection of a charge particle in transverse magnetic field applied over a small region. 5

Unit IV

10. What is thin film? With necessary ray diagram derive the equation for constructive and destructive interference pattern in terms of path difference of light. 6
11. Define Diffraction grating & explain the working of plan transmission grating. 5

Unit V

12. Define Acceptance angle. Derive the equation for Acceptance angle and N.A. in case of fibre optics cable. 6
13. Describe the principle and construction of optical fibre. 5
14. What is Attenuation? Describe the absorption, Scattering and Bending losses in fibre optics cable. 7
15. Explain the construction and working of Ruby LASER with the help of suitable diagram. 6

Unit VI

16. State & prove Bernoulli's theorem. Give its applications. 7
17. Prove the Poiseuille's equation 6

Important Questions (4 Marks)

Unit I

1. Explain Zener break and avalanche breakdown mechanism of Zener diode. 4
2. Explain the working of PN-junction diode in Forward and Reverse bias mode. 4
3. What is LED? Explain the construction and working of LED. 4
4. Explain the effect of temperature on position of fermi level in N type semiconductor. 4

Unit II

5. Prove that for an electron accelerated by potential 'V', De-Broglie's wavelength is given by 4
$$\left(\frac{12.27}{\sqrt{V}}\right) \text{ \AA}.$$
6. Show that electron does not recite in the nucleus. 4
7. Show that total energy of moving particle of mass m & relativistic velocity v is 4
$$E=(P^2C^2+m_0^2C^4)^{1/2}$$

Unit III

8. Prove that electron traces parabolic path in the region of transverse electric field applied perpendicular to it. 4

Unit IV

9. Derive the equation for wavelength of monochromatic light used in case of Newton's Ring's experiment. 4
10. Derive the equation for refractive index of medium used in case of Newton's Rings. 4
11. What is diffraction grating? Derive grating equation. 4
12. Find the wavelength of light with help of Newtons rings. 4
13. Find the equation of radius of Newtons ring and show that dark ring is always surrounded by bright ring. 4

Unit V

14. Explain step Index and Graded Index fibre. 4
15. Explain Spontaneous & Stimulate emission 4
16. Explain optical pumping in laser. 4
17. Explain the population inversion in laser 4

Unit VI

18. What are factors affecting Acoustical planning of building? Discuss. 4
19. Explain the production of ultrasonics by the converse of Piezo electric effect. 4

Important Questions (2-3 Marks)

Unit I

1. Write down conductivity equation for intrinsic, P-type and N-type semiconductors specifying the terms used in it. 3
2. Explain Law of Mass action and charge neutrality condition. 3
3. Enlist the materials used for LED? Define striking potential in LED. State the advantages of LED. 2+1+2

Unit II

4. What are matter waves? Give its properties. 3
5. State the Heisenberg uncertainty principle. 2

Unit III

6. What are positive rays? State their properties. 3

Unit IV

7. Give the conditions for sustained interference. 2
8. Distinguish between Fresnel and Fraunhofer class of diffraction. 3

Unit V

9. Give the Advantages of optical fibre. 3
10. Give the Applications of optical fibre. 3
11. Explain Total Internal reflection. 2
12. Give the characteristics and applications of LASER. 2
13. Define N.A and Numerical aperture 2

Unit VI

14. Write Sabine's formula for reverberation time and explain the meaning of each term. 3
15. Explain Stoke's Law. 2
16. Write few applications of ultrasonic waves? 2
17. Differentiate between streamline flow and turbulent flow. 3
18. Define Echo and Reverberation. 2

