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| Bon Secours College for Women Nationally Accredited with “A” Grade by NAAC (Affiliated to Bharathidasan University, Trichy-24) Recognized by UGC Under Section 2(f) & 12 (B)    Vilar Bypass, Thanjavur-613 006. |

**DEPARTMENT OF PHYSICS**

**OPTOELECTRONICS AND FIBREOPTIC COMMUNICATION**

**Unit – I**

**2 Marks**

1. Define trap?
2. What is exciton?
3. Write the properties of light?
4. What is reflection?
5. What is refraction?
6. Give the example for dielectric medium?
7. What is the velocity of light in vacuum?
8. What is metal?
9. What is insulator?
10. What is semiconductor?
11. How the metal, semiconductor, dielectric are classified?
12. Write the band gap range for semiconductor?
13. Why semiconductor materials choose for electronic circuit?
14. Give the example for semiconductors?
15. What is the classification of semiconductor?
16. What is intrinsic semiconductor?
17. What is extrinsic semiconductor?
18. What happened when light fall on the metal?
19. What mechanism involved for absorption in semiconductor?
20. What are the two types of transition involved in trap?
21. Why trap exist?
22. What is color centre?
23. What are the types of color centre?
24. What is “V” centre?
25. What is “F” centre?
26. How the color centers are generated?
27. Define luminescence?
28. Write the types of luminescence?
29. What is photoluminescence?
30. What is the source in photoluminescence?
31. When yellow color generated?
32. What is refractive index?

**5 Marks**

1. Write a short note on absorption?
2. Explain about the optical absorption in metals?
3. Write a short note on optical absorption in dielectrics?
4. Write a short note on reflection?
5. State trap? Explain it?
6. What is exciton? Discuss about it?
7. Why the colors centers are arise?
8. Explain one of the methods to generate the color centre?
9. How to generate the color centre using chemical method?
10. Write short note on photoluminescence?

**10 Marks**

1. Explain what is the relation between trap and exciton?
2. Describe about the color centre?
3. Explain the luminescence in detail?
4. Explain the various methods to generate the color centre?
5. Deduce the absorption coefficient?
6. Give the explanation for optical absorption in semiconductor?
7. Write a short note on (i). Optical absorption in metal (ii). Traps
8. Give the explanation for reflection and exciton?
9. Discuss about different color centre?

**Unit – III**

**2 Marks**

1. What is acronym for laser?
2. Write the principle of laser?
3. What is absorption?
4. What is emission?
5. Write the Einstein coefficient?
6. What is spontaneous emission?
7. What is stimulated emission?
8. Give the two differences for spontaneous and stimulated emission?
9. Write the characteristics of laser?
10. Define population inversion?
11. What is population?
12. What is secondary photon?
13. Why the laser waves are in phase?
14. Write the threshold condition for laser action?
15. Define coherence?
16. What is laser spot size?
17. What are types of laser
18. What is Meta stable state?
19. Write the life time of excited state and meta stable state?
20. What is the principle of CO2 laser?
21. What type of pumping process involved in CO2 laser?
22. What is pumping?
23. Write the principle of semiconductor laser?
24. What is beam divergence?
25. Write two applications of semiconductor laser?
26. What are the modes involved in CO2 laser?
27. What is symmetric stretching mode?
28. What is bending mode?
29. What is asymmetric stretching mode?
30. How semiconductor laser useful in semiconductor laser?

**5 Marks**

1. Write a short note on absorption?
2. Explain about stimulated emission?
3. What is spontaneous emission? Explain it?
4. Differentiate the spontaneous emission and stimulated emission?
5. Why stimulated emissions exist in laser action?
6. Give the principle of laser?
7. Write a short note on optical feedback?
8. Explain the properties of laser?
9. Give the structure of semiconductor laser?
10. Write the application of semiconductor laser?
11. Give the structure of CO2laser?
12. Deduce the Einstein absorption coefficient?
13. Write a short note on coherence?
14. Explain about beam divergence?
15. Deduce the formula for laser spot size?
16. What is the importance of threshold condition?
17. Give the explanation the property directionality?
18. Write the excitation mechanism of CO2laser?
19. Give the excitation explanation of semiconductor laser?
20. Give the explanation for radiant power?

**10 Marks**

1. Derive the Einstein coefficient?
2. Explain about the laser action in detail?
3. Derive the threshold condition for laser action?
4. Give the detail explanation about spontaneous emission and stimulated emission?
5. What is the importance of optical feedback? explain it?
6. What are the properties involved in laser? Discuss it?
7. Explain about the coherence?
8. Write a short note on (i) Laser spot size (ii)Beam divergence
9. Explain about (i) Radiant power (ii) Coherence.
10. Discuss about the CO2laser?
11. Explain about the semiconductor laser?
12. Write the application of semiconductor laser?

**Unit – IV**

**2 Marks**

1. What is acceptance angle of a fiber?
2. Define numerical aperture of a fiber?
3. What is the structure of the optical fiber?
4. How are fibers classified?
5. What is monomode?
6. Define multimode?
7. How does the refractive index of the core vary with radius in a graded index fiber?
8. Define attenuation loss in fiber?
9. What are the different dispersion mechanisms in fibers?
10. What is intermodal dispersion in a fiber?
11. What are bandwidth and band width-dispersion product of a fiber?
12. What is chromatic dispersion in a fiber?
13. What are the different loss parameters involved in the light transmission through an optical fiber?
14. What are the desirable characteristics of light sources for fiber optics?
15. Draw diagram for fiber optic communication link?
16. What are modulation and demodulation?
17. What is fiber amplifier?
18. What is the requirement to achieve the total internal reflection?
19. Write the Snell’s law?
20. Why the fiber made by silica?
21. Write the two qualities to choose the light source for fiber optics?
22. What is bending loss?
23. Give the formula to find the decibel loss of optical power in a fiber?
24. What are the mechanism contribute the absorption losses/
25. What are TE and TM modes?
26. What is called normalized frequency?
27. Write the two types of index profile?
28. Based on which principles light propagate through optical fiber?
29. What are material choose as a light source for optical fiber?
30. Write the two advantages for optical fiber?

**5 Marks**

1. Explain with the theory how modes are formed?
2. Derive an expression for numerical aperture?
3. With the theory explain the working of laser diode?
4. Derive the angle of acceptance in terms of refractive indices Of the core and cladding?
5. What are the requirements of a photo detector to serve as signal detector at the receiving end of a fiber?
6. Write brief note on any one of the photo detectors which satisfy all these requirements?
7. Give the introduction about the optical fiber?
8. With the theory explain the fiber optic communication link?
9. Write a short note on principle of light transmission in a fiber?
10. What are the profile involved in optical fiber explain it?
11. Write the requirements of light sources for optical fiber?
12. What is scattering losses? Explain it?
13. Write a short note on bending losses?
14. Why the absorption losses arise? Explain it?
15. Give the theory of avalanche photo diode?
16. Derive the condition to meet the total internal reflection for optical fiber?