Physics, II course

EXAM QUESTIONS ON OPTICS-2022

1. The nature of light. Newton’s and Huygens hypotheses
2. Explanation propagation of light by Newton
3. Explanation propagation of light by Huygens
4. Electromagnetic theory of light. Maxwell’s equations
5. Energy of electromagnetic wave. Poynting’s vector.
6. Phase and group velocity of light. Rayleigh’s equation
7. Curve of sensitivity
8. Photometric quantities and units. Solid angle, luminous flux, light intensity
9. Photometry. Illuminance, luminous emittance , luminance
10. Coherence. Interference of light waves
11. Interference of light waves. A resulting amplitude of harmonic oscillation
12. The fringe width of interference pattern.
13. Ways of obtaining coherent sources. By division of amplitude
14. Ways of obtaining coherent sources. By division of wave front
15. Interference in thin parallel plate
16. Newton rings
17. Newton rings in transparent rays
18. Jamin interferometer
19. Michelson interferometer
20. Difraction of light. Huygens-Fresnel principle
21. Difraction of light. Fresnel zone method
22. Area and radius of Fresnel zone
23. Fresnel’s diffraction from a simple barriers
24. Fraunhofer diffraction. Difraction from a single slit
25. Double and more slits diffraction
26. Diffraction grating
27. Fermat's principle
28. Propagation light in homogenous media according to the Fermat's principle
29. Derivation the refraction law by Fermat’s principle
30. Derivation the reflection law by Fermat’s principle
31. Centered optical systems. Thin lens equation
32. Types of lenses and construction of images
33. The formula lens of arbitrary thickness
34. Light absorption.
35. The Beer-Lambert law.
36. Rayleigh scattering

37. Light dispersion. Normal and anomalous dispersion
38. Electron theory of light dispersion
39. Polarization of light
40. Polarized and unpolarized light. Malus’s law
41. Polarization in reflection and refraction. Brewster’s law
42. Birefringence. Ordinary and extraordinary beams
43. An uniaxial and biaxial crystals.
44. Artificial double refraction
45. Thermal radiation. Emissivity and absorptivity
46. Kirchhoff's law of thermal radiation
47. The Stefan–Boltzmann law
48. The Rayleigh–Jeans Law
49. Ultraviolet catastrophe
50. Wien's law. Wien's displacement law
51. Planck’s equation. Quantum nature of light
52. Obtaining the Stefan–Boltzmann law from Planck equation
53. Obtaining the Rayleigh–Jeans Law from Planck equation
54. Obtaining the Wien's Law from Planck equation
55. An optical quantum generator (laser).
56. Principle of work of ruby laser
57. Properties of laser light
58. Photoelectric effect. Stoletov’s Law
59. Photoelectric effect. Einstein's formula
60. The Compton effect.