

TB144460B

Reg. No:

Name:

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017
(Supplementary – 2014 Admission)
SEMESTER IV – COMPLEMENTARY (PHYSICS)
PHY4PLS - PHYSICAL OPTICS, LASER PHYSICS AND SUPERCONDUCTIVITY
(For Chemistry)

Time: Three Hours

Maximum Marks: 60

PART A

I Answer all questions. Each question carries 1 mark

1. Give two examples each for interference by division of wavefront and division of amplitude.
2. What do you mean by coherent sources? Give two examples.
3. Diffraction effects are commonly observed with sound, but not with light. Give reason.
4. Light waves can be polarised, but sound waves cannot be polarised. Why?
5. What is meant by double refraction?
6. Give the characteristic properties of a laser beam.
7. What is Meissner effect?
8. Give any two applications of superconductivity.

(8x1=8)

PART B

II Answer any six questions. Each question carries 2 marks

9. Distinguish between Fresnel and Fraunhofer class of diffraction.
10. Define and explain the term dispersive power of a grating. Give the expression for it.
11. Explain colours in thin films.
12. Explain polarization by reflection and arrive at Brewster's law.
13. Give the principle and use of quarter wave plate.
14. State and explain Malu's law.
15. What is dc Josephson effect?
16. What is meant by population inversion? Give a method for achieving the same.
17. Differentiate between spontaneous and stimulated emission
18. Briefly discuss the features of BCS theory.

(6x2 =12)

PART C

III Answer any four questions. Each question carries 4 marks

19. Newton's rings are formed with red light of wavelength 670 nm. The radius of 20th ring is found to be 1.1×10^{-2} m. Find the radius of curvature of lens and the radius of 30th ring.
20. Light of wavelength 500 nm is incident normally on a plane transmission grating. A 2nd order spectral line is observed at an angle 30° . Calculate the number of lines per metre on the grating surface.
21. Calculate the thickness of a half wave plate for light of wavelength 589.3 nm. Principal refractive indices are $n_o = 1.544$ and $n_e = 1.553$.

22. A ray of light is incident on the surface of a glass plate of refractive index 1.55 at the polarising angle. Calculate the angle of refraction.
23. Differentiate between type I and type II superconductors
24. Explain the three types of transitions involving electro magnetic radiation between two energy levels E_1 and E_2 .

(4x4=16)

PART D

IV Answer any two questions. Each question carries 12 marks

25. Describe the method of producing linearly polarised, circularly polarised and elliptically polarised light.
26. With neat diagrams, explain the working of He-Ne gas laser.
27. What are Newton's rings? Describe with necessary theory how you would determine the wavelength of sodium light using Newton's rings.
28. Describe Fresnel's diffraction at a straight edge. Derive an expression for the distance of nth bright band from the edge of geometric shadow.

(2 x12=24)