

E 2136

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Reg. No.....

Name.....

**B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, APRIL 2016**

**Fourth Semester**

B.Sc. Physics

**Complementary Course—PHYSICAL OPTICS, LASER PHYSICS AND  
SUPERCONDUCTIVITY**

(For Chemistry Model I Geology and Chemistry Environment and Water Management)

[2013 Admission onwards]

Time : Three Hours

Maximum Marks : 60

**Part A (Very short Answer Questions)**

*Answer all questions.  
Each question carries 1 mark.*

1. What is superposition ?
2. How does interference in thin films differ from that in other sources ?
3. What is dispersive power of grating ?
4. What is refraction ?
5. Define Dichroism.
6. What are the applications of polaroids ?
7. How is population inversion achieved ?
8. Define half wave plate.

(8 × 1 = 8)

**Part B (Brief Answer Questions)**

*Answer any six questions.  
Each question carries 2 marks.*

9. Differentiate uniaxial and biaxial plates.
10. Write the expression for fringe width ?
11. How is minimum intensity achieved ?
12. Discuss the theory of plane transmission grating.
13. What is Josephson's effect ?
14. Explain the principle of ruby laser.
15. How do light waves differ from sound waves ?
16. Define selective absorption.

Turn over

17. Write a note on vibration.
18. List some properties of laser beams.

(6 × 2 = 12)

**Part C (Problems/Derivations/Short essays)**

*Answer any four questions.  
Each question carries 4 marks.*

19. Find the radius of curvature of 25<sup>th</sup> Newton's ring if the wavelength of light is 750 nm and radius of 10th ring is 0.25 cm.
20. In young's double slit experiment spacing between the slits is given to be 15mm. If the wavelength of the light is 4000 Å determine angular width of the fringe.
21. Determine the angular separation between the wavelengths 4580 Å and 5000 Å if the number of lines in a plane diffraction grating is 3000.
22. Derive the expression for phase retardation of arrays in plane polarization.
23. If the capacity of a laser is 4.25 micrometer, calculate the energy difference between upper and lower levels of wavelength.
24. Explain the principle and working of diode laser.

(4 × 4 = 16)

**Part D (Essay Questions)**

*Answer any two questions.  
Each question carries 12 marks.*

25. Explain with relevant derivations how wavelength of light is determined in plane diffraction grating.
26. Explain polarization by scattering. Discuss the theory of elliptically and circularly polarized light.
27. Explain how wavelength of sodium light is measured using Newton's rings.
28. What is BCS theory? How it is relevant in super conductivity?

(2 × 12 = 24)