

**E 5308**

(Pages : 4)

Reg. No.....

Name.....

**B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, APRIL 2013**

**Fourth Semester**

**Complementary Course—PHYSICAL OPTICS, LASER PHYSICS AND SUPER CONDUCTIVITY**

(For the Programmes B.Sc. Chemistry Model—I, B.Sc. Chemistry—Environment and Water Management and B.Sc. Geology)

Time : Three Hours

Maximum Weight : 25

*Answer all questions in Part A. this contain 4 bunches of objective questions.  
Answer any five questions from Part B, any four from Part C and any two from Part D.  
Candidates can use clark's table and scientific non-programmable calculators.*

**Part A (Objective Type)**

*Choose the most appropriate alternative. Weight 1 each.*

**BUNCH I**

1. The center of Newton's ring experiment appeared :  
(a) Dark. (b) Bright.  
(c) Partially dark. (d) Partially bright.
2. Colours in soap bubbles can be explained using :  
(a) Refraction. (b) Diffraction.  
(c) Interference. (d) None of these.
3. The property which can prove the transverse nature of light is :  
(a) Diffraction. (b) Polarization.  
(c) Superposition. (d) None of these.
4. A Polaroid produces :  
(a) Plane polarized light. (b) Circularly polarized light.  
(c) Unpolarized light. (d) Elliptically polarized light.

**BUNCH II**

5. The linearly polarized light is split into two rays due to :  
(a) Polarization. (b) Diffraction.  
(c) Double refraction. (d) Reflection.

**Turn over**

6. Two sources of monochromatic light  $S_1$  and  $S_2$  are separated by a distance of  $\lambda/2$  apart. Then a point lying on the line bisecting the two sources will have :
- (a) Maximum intensity. (b) Minimum intensity.  
(c) Average intensity. (d) None of these.
7. Ratio of intensities between a point A and that of central fringe is 0.853. Then path differences between two waves at point A will be :
- (a)  $\lambda/2$ . (b)  $\lambda/4$ .  
(c)  $\lambda/3$ . (d)  $\lambda/8$ .
8. Laser light is used to produce :
- (a) Fresnel diffraction. (b) Fraunhofer diffraction.  
(c) Both of these. (d) None of these.

## BUNCH III

9. Along optic axis e-ray o-ray has :
- (a) Same velocity. (b) Greater velocity for o-ray.  
(c) Greater velocity for e-ray. (d) Cannot predict.
10. Which among the following laser is more efficient ?
- (a) Ruby laser. (b) He-Ne laser.  
(c) YAG laser. (d) Cannot predict.
11. In a diffraction experiment using a straight edge, the diffraction pattern is obtained ——— the edge of geometric shadow :
- (a) Above. (b) Below.  
(c) Parallel to. (d) Close to.
12. Pumping source suitable for gas laser is :
- (a) Optical pumping. (b) Electrical pumping.  
(c) Chemical pumping. (d) None of these.

## BUNCH IV

13. Which of the following is a white dwarf ?
- (a) Sirius B. (b) Sirius A.  
(c) Betelgeuse. (d) Vega.
14. Density of a neutron star is about the same as that of :
- (a) White dwarf. (b) Sun.  
(c) An atomic nucleus. (d) A water molecule.



15. Among the following properties which is characteristics for transverse waves ?  
(a) Diffraction. (b) Polarization.  
(c) Superposition. (d) None of these.
16. Which colour star is likely to be hottest ?  
(a) Red. (b) Yellow.  
(c) Blue-violet. (d) Green.

(4 × 1 = 4)

**Part B (Short Answer Type Questions)**

*Answer any five questions.  
Each question carries a weight of 1.*

17. Compare Fresnel and Fraunhofer diffraction.  
18. What do you mean by dispersive power ?  
19. Explain double refraction.  
20. How does laser differ from ordinary light ?  
21. Explain plane polarized light.  
22. Discuss two applications of laser.  
23. What do you mean by super nova explosion ?  
24. Write note on black holes.

(5 × 1 = 5)

**Part C (Short Essay/ Problems)**

*Answer any four questions.  
Each question carries a weight of 2.*

25. Discuss stimulated emission.  
26. Discuss polarization by scattering.  
27. In Young's double slit experiment, using monochromatic light, fringe pattern shifts by a certain distance on the screen when a mica sheet of refractive index 1.6 and thickness 1.964 mm is introduced in the path of one of the two waves. If now mica sheet is removed and distance between slit and screen is doubled, distance between successive maxima remains unchanged. Find the wavelength used.  
28. Discuss Fraunhofer diffraction by a slit.  
29. Briefly discuss neutron stars.  
30. Write notes on elements present in a stellar atmosphere.

(4 × 2 = 8)

Turn over

**Part D (Essay Type Questions)**

*Answer any two questions.*

*Each question carries a weight of 4.*

31. What do you mean by laser ? Discuss He-Ne laser.
32. Discuss elliptical polarization. What is the importance of polarization ?
33. Write an essay on Stellar evolution.

(2 × 4 = 8)