B. Sc. DEGREEE (C.B.C.S.S) EXAMINATION, APRIL 2018
(2014 Admission Supplementary)
SEMESTER IV - COMPLEMENTARY COURSE (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.   Define resolving power of a grating.
2.   How would you obtain Newton's rings with bright center?
3.   What is meant by interference of light?
4.   Can sound waves be polarized? Why?
5.   What is a quarter wave plate?
6.   Distinguish between stimulated emission end spontaneous emission.
7.   Discuss the characteristics of laser beam.
8.   List some applications of super conductivity.

(8x1= 8)

PART B

II   Answer any six questions. Each question carries 2 marks

9.   State and explain superposition principle.
10.   Intensities of spectral lines with a grating are much less than those with a prism. Why?
11.   Explain what you mean by diffraction of light.
12.   What are coherent sources? How can you obtain them?
13.   Explain phase change on reflection.
14.   When white light is used to produce interference fringes, fringe width for red is greater than that for blue. Why?
15.   Distinguish between uniaxial and biaxial crystals with examples.
16.   Explain polarization by scattering.
17.   What is Brewster's angle? What is its significance?
18.   Explain Meissner effect.

(6x2=12)

PART C

IV Answer any four questions. Each question carries 4 marks

19. The limits of the visible spectrum are approximately $4000A^0$ and $7000A^0$. Find the angular width of the first order spectrum by a grating having 5×10^5 lines per meter.

20. Two coherent sources are 0.18mm apart and the fringes are observed on a screen 80cm away. It is found that with a certain monochromatic source of light, the fourth bright fringe is situated at a distance of 10.8mm from the central fringe. Calculate the wavelength of light.

21. A monochromatic light of wavelength 6.56×10^{-5}cm is incident on a plane transmission grating of width 2cm. If the first order is formed at $18°14^l$, find the total number of lines in the grating.

22. Determine the polarizing angle on the surface of water. Given the refractive index of water air interface is 1.35.

23. Find the thickness of a quarter wave plate of quartz for sodium light of wavelength 589.3nm. Given for quartz, n_o=1.5442 and n_E=1.5533.

24. Show that the probability of stimulated emission is same as that of stimulated emission.

(4x4=16)

PART D

IV Answer any two questions. Each question carries 12 marks

25. Derive an expression for the conditions of brightness and darkness produced under oblique incidence of light on a plane film producing interference due to reflected light.

26. Explain with theory the production and detection of elliptically polarized light.

27. With a neat diagram, explain the principle and working of Helium – Neon laser.

28. Explain BCS theory of super conductivity.

(2x12=24)