Reg. No…….. Name…… **19U428**

B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2019

SEMESTER **– 4: PHYSICS (COMPLEMENTARY FOR CHEMISTRY)**

COURSE: **15U4CPPHY8, PHYSICAL OPTICS, LASER PHYSICS AND SUPERCONDUCTIVITY**

(Common for Regular 2017 admission and improvement 2016/ supplementary 2016/2015/2014 admission)

Time: Three Hours Max. Marks: 60

PART A (Very Short Answer Questions.)

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

1. What do you mean by the interference of light?
2. What type of light source is required for interference by division of wave-front? (point Source / broad source)
3. Define the term resolving power of grating
4. What do you mean by optic axis of a doubly refracting crystal?
5. When a plane polarized light is passed through a rotating nicol prism, what happens to the transmitted intensity?
6. What do you mean by stimulated emission of radiation?
7. Give two applications of laser beams.
8. In which element was superconductivity detected for the first time? (1 x 8 = 8)

PART B (Brief Answer Questions)

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

9. What are the conditions for two light sources to be coherent? Is it possible to generate two coherent sources from independent sources?
10. Give the conditions for maxima and minima in the case of interference in thin films.
11. Distinguish between Fresnel and Fraunhofer diffractions.
12. What are half wave plates?
13. Discuss any two ways of producing linearly polarized light.
14. Using a suitable figure, explain Brewster's law.
15. Discuss the properties of laser beams.
16. Explain a superconducting transition. Give any two applications of superconductors.

(2 × 6 = 12)

PART C (Problems/Derivations.)

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

17. In Newton's rings experiment, the diameter of a ring changes from 1.2 cm to 1 cm when the air space between the lens and the glass plate is replaced by a transparent liquid. Determine the refractive index of the liquid.
18. Find resolving power of a grating with 6000 lines per cm and 3 cm wide in first order spectrum.

19. A plane polarized light passes through a uniaxial crystal with its optic axis parallel to the faces. Determine the least thickness of the plate for which the emergent beam is plane-polarized. Given $\mu_e = 1.5533, \mu_o = 1.5442, \lambda = 500\,nm$.
20. Two polarizing plates have polarizing directions parallel so as to transmit maximum intensity of light. Through which angle must either plate be turned so that the intensity of the transmitted beam is to drop by one third?
21. Discuss the working principle of a Nd-YAG laser.
22. Discuss DC and AC Josephson effects in superconductors. (4 × 4 = 16)

PART D (Long Answer Questions.)

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

23. Explain Young's double slit experiment and derive expression for fringe width.
24. What is a plane transmission grating? Explain the determination of wave length of spectral lines using transmission grating.
25. Explain the production and detection of a circularly polarized light.
26. Explain Meissner effect in superconductors. Using suitable magnetization curves, distinguish between type-I and type-II superconductors. (12 × 2 = 24)

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