TB144450B   **Reg. No: ………………….**

Name: …………………….

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017
(Supplementary – 2014 Admission)
SEMESTER IV – COMPLEMENTARY COURSE (PHYSICS)
PHY4PLA - PHYSICAL OPTICS, LASER PHYSICS AND ASTROPHYSICS
(For Mathematics)

Time: Three Hours   **Maximum Marks: 60**

PART A

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

1.   Two independent sources can't produce interference. Why?
2.   What is meant by interference of light?
3.   Define diffraction phenomenon of light. What are its type?
4.   How can plane polarized light be detected?
5.   What do you mean by double refraction?
6.   What is population inversion?
7.   Give any three applications of Laser beam.
8.   What is supernova explosion?

(8x1=8)

PART B

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

9.   Write the condition for the film to appear bright and dark.
10. How can you determine the wavelength using Newton's rings experiment?
11. Compare interference and diffraction.
12. Distinguish between positive and negative crystals.
13. Explain polarization by reflection.
14. Explain the working of ruby laser.
15. What is the difference between spontaneous emission and stimulated emission.
16. Draw the energy level diagram of Neodymium YAG laser.
17. Explain a method to determine the distance of stars.
18. Discuss the relation between temperature and color of a star.

(6x2=12)

PART C

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

19. In Newton's rings experiment the diameter of 15th ring was found to be 0.59 cm and that of the 5th ring was 0.336 cm. If the radius of plano - convex lens is 100 cm, calculate the wave length of light used.

20. Examine if two spectral lines of wavelength 5890 A^o and 5896 A^o can be clearly resolved in first order by a diffraction grating of width 2 cm and having 425 lines per cm.

21. Calculate the thickness of a quarter wave plate of quartz for light of wavelength 5000 A°.

22. A ray of light is incident on the surface of a calm lake and the reflected light is 100% polarized at certain instant. What is the angle of refraction at that instant. The refractive index of water is 1.33.

23. At what temperature the rate of probabilities of spontaneous emission and stimulated emission becomes equal? Assume = 5000 A°

24. Write brief notes on:
    a) White dwarf
    b) Neutron star
    c) Black hole

(4x4=16)

PART D

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

25. Explain Young's double slit experiment. Deduce an expression for interference band width.

26. Discuss the theory of grating. Describe the method of determining the wavelength using grating.

27. Discuss the production of elliptically and circularly polarized light.

28. Describe the working of He-Ne laser.

(2x12=24)