TB145660A   Reg. No:............................

                                                           Name :............................

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2016
SEMESTER V - PHYSICS
PHY5POP - PHYSICAL OPTICS & PHOTONICS

Time: Three Hours   Maximum Marks: 60

PART A

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

1.   What is an air wedge?
2.   How does a zone plate differ from a convex lens?
3.   Define principal refractive index of extraordinary ray in negative uniaxial crystal
4.   Sound waves cannot be polarised. Why?
5.   What is quarter wave plate?
6.   What is population inversion?
7.   What is meant by read out waves?
8.   What is meant by numerical aperture?

                                                                    (8x1=8)

PART B

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

9.   How would you obtain Newton 'rings with bright centre?
10.   A zone plate has different foci for different wavelength. Why?
11.   State and explain Brewster' Law.
12.   What is' specific rotation' in optical activity? On what factors it depends.
13.   Explain the optic axis and principal section of a crystal.
14.   A transparent plate is given.Using two nicols how would you find whether the plate is a quarter wave plate , half wave plate or an ordinary glass plate?
15.   How can you convert a plane polarised light into circularly polarised light.
16.   Explain three level pumping scheme.
17.   Distinguish between reference beam and object beam in holography.
18.   Distinguish between step index and graded index fibre.

                                                                    (6x2=12)

PART C

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

19.   A convex lens of radius of curvature 50 cm. is placed over a glass plate and Newton's rings are observed in reflected light. The diameter of 3rd bright ring is 0.181 cm. and that of the 22nd is 0.501 cm. Calculate the wavelength of light used.

20.   Light of wavelength $5000A^0$ is incident normally on a diffraction grating of width 3 cm and 15000 lines. Find the angle of diffraction in the first order.

21.   A ray of light is incident on the surface of a glass plate of refractive index 1.55 at the polarising angle. Calculate the angle of refraction.

22. Find the ratio of populations of the two states in He-Ne laser that produces light of wavelength 6328 A^o at 27^0 C.
23. The Co_2 laser is one of the most powerful lasers. The energy difference between the two laser levels is 0.117 eV. Determine the frequency and the wavelength of radiation.
24. The length of a laser tube is 17mm and the gain factor of the laser material is 0.0006/cm. If one of the cavity mirrors reflects 100% light that is incident on it, what is the required reflectance of the other cavity?

(4x4=16)

PART D

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

25. Discuss the theory of Newton's rings and determination of wavelength.
26. Discuss the Fraunhoffer diffraction pattern at a double slit. Explain how certain orders of spectra will be missing in the double slit diffraction pattern?
27. Describe the construction and working of a Laurent's half shade polarimeter.
28. With the help of energy band diagram discuss the working of a semiconductor laser.

(2x12=24)