Reg. No .... Name **20U325**

B. Sc DEGREE END SEMESTER EXAMINATION - OCT. 2020 : JANUARY 2021

SEMESTER 3 : PHYSCIS

COURSE : **19U3CRPHY3 : OPTICS, LASER AND FIBER OPTICS**

(For Regular - 2019 Admission)

Time : Three Hours Max. Marks: 60

PART A

Answer any 8 (2 marks each)

1. How may we find zero path difference in the case of Michelson interferometer?
2. The fringes in the case of an air wedge experiment are equidistant where as in the case of Newton's rings are not so. Why?
3. What will you observe if the monochromatic source, in the case of a Newton's rings setup is replaced with white light?
4. What will you observe when a Michelson interferometer set for observing straight fringes with monochromatic light, has the light source replaced with white light?
5. Explain the significance of Fabry- Perot resonator.
6. Identify the role of Helium in a He-Ne laser.
7. Illustrate the merits of semiconductor diode laser.
8. What are negative crystals? Give one example each.
9. Give some examples of polaroid’s.
10. What is a half wave plate?

(2 x 8 = 16)

PART B

Answer any 6 (4 marks each)

11. A light source emits two wavelengths 450 nm and 510 nm and this is used in a double slit experiment. The screen is kept 1.5 m away from slits which are 25 microns away from each other. Calculate the separation between third order bright fringes due to these two wavelengths.
12. When a thin sheet of transparent material of thickness 6.3 microns is introduced in the path of one of the interfering beams, the central fringe shifts to a position occupied by the sixth fringe. If the wavelength used is 546 nm, find the refractive index of the sheet.
13. A circular aperture of 1.5 mm diameter is illuminated by plane monochromatic waves. The diffracted light is recieved on a distant screen which is gradually moved towards the aperture. The center of the circular patch of light first becomes dark when the screen is 30 cm from the aperture. Calculate the wavelength of light.
14. Find the relative populations of the two states in a ruby laser that produces light of wavelength 6943Ǻ at 300K.
15. The wavelength of emission is 6000 Ǻ and the coefficient of spontaneous emission is 10^6/S. Identify the coefficient of stimulated emission.
16. Find the coherence length and coherence time of a white light source with frequency range from $0.4x10^{15}$Hz to $0.7x10^{15}$Hz.
17. Determine the angle of incidence for which light reflected from glass surface is completely polarized. Refractive index of air glass interface is 1.5.
18. Demonstrate polarization by reflection and polarization by refraction.

(4 x 6 = 24)

PART C

Answer any 2 (10 marks each)

19. Discuss Young's double slit experiment. Obtain expressions for dark and bright fringes, as well as for fringe width.
20. Discuss the attenuation in optical fiber. List out and explain in detail different types of attenuation.
21. Discuss various processes taking place during the interaction between light and matter. Obtain the Einstein’s relations.
22. Describe a Nichol prism. Explain its action as a polarizer and an analyser.

(10 x 2 = 20)