

C 82451

(Pages : 2)

Name.....

Reg. No.....

SECOND SEMESTER (CBCSS—UG) DEGREE EXAMINATION, APRIL 2020

Physics

PHY 2C 02—OPTICS, LASER, ELECTRONICS

Time : Two Hours

Maximum : 60 Marks

Section A (Short Answer Type)

Answer all questions in two or three sentences, each correct answer carries a maximum of 2 marks.

1. What do you mean by the term coherence length ?
2. For interference in thin films in a reflected system, write down the condition for constructive and destructive interferences.
3. Compare Fresnel and Fraunhofer types of diffractions.
4. What do you mean by the grating constant of a plane transmission grating ?
5. It is possible to polarize a sound wave ? Why ?
6. What is Brewster's law ?
7. Distinguish between positive and negative doubly refracting crystals.
8. What are polaroids ? Mention two applications.
9. Write down de Morgan's theorems.
10. What do you mean by the term ripple factor ? Give its value for a half wave rectifier.
11. Distinguish between spontaneous and stimulated emission processes.
12. What do you mean by population inversion in a laser ? Name a mechanism to attain the same.

(Ceiling-20)

Section B (Paragraph/Problem Type)

Answer all questions in a paragraph of about half a page to one page, each correct answer carries a maximum of 5 marks.

13. Light of wavelength $5000 \text{ \AA}$ from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen placed 100 cm away is 0.5 cm, determine the fringe separation.
14. Calculate the minimum number of lines on a grating that will just resolve the sodium lines $5890 \text{ \AA}$ and $5896 \text{ \AA}$ in the first order spectrum.

Turn over

15. Show that when unpolarized light is passed through a polarizer, the intensity of the transmitted light is half that of the incident light.
16. Calculate the thickness of doubly refracting glass plate capable of producing a path difference of $\lambda/4$ between the ordinary and extraordinary waves. Given, the wavelength of light used $\lambda = 5890 \text{ \AA}$, refractive index for the ordinary ray = 1.54 and the refractive index for the extraordinary ray = 1.53.
17. A 10 V Zener diode along with a series resistance is connected across a 40 V supply. Calculate the minimum value of the resistance required, if the maximum Zener current is 50 mA.
18. Show how an OR operation be realized using three NAND gates.
19. Using a suitable energy level diagram, explain the working principle of a Ruby laser.

(Ceiling-30)

Section C (Essay Type)

Essays. Answer in about two pages, any one question.

Answer carries 10 marks.

20. Using a neat diagram, discuss the method of forming Newton's rings by reflected light. Write down the condition for bright and dark rings. Obtain an expression for the radii of the rings formed.
21. What do you mean by the CE configuration of a transistor? Drawing suitable figures, explain the input and output characteristics of a transistor in CE configuration.

(1 × 10 = 10 marks)