C 22102 (Pages : 2) Name...

Reg. No.....................................

SECOND SEMESTER (CBCSS—UG) DEGREE EXAMINATION
APRIL 2022

Physics/Applied Physics

PHY 2C 02—OPTICS, LASER AND ELECTRONICS

(2021 Admissions)

Time : Two Hours Maximum : 60 Marks

Section A

Answer at least **eight** *questions.*
Each question carries 3 *marks.*
All questions can be attended.
Overall Ceiling 24.

1. What is meant by constructive interference ?

2. Explain why very thin film appears black in reflected light ?

3. What is the phenomenon of diffraction ? Give an example.

4. What is meant by resolving power of a grating ?

5. State and explain Brewster's law.

6. Write different methods to produce polarized light.

7. What is a zener diode ? Explain its characteristics.

8. Define rectifier efficiency. Write down the expression for the efficiency of a half wave rectifier.

9. What are the different types of transistor configurations ? Explain.

10. Describe the action of a π-filter circuit.

11. Explain OR function with a two input OR gate.

12. What is a coherent source of light ? Give example.

(8 × 3 = 24 marks)

Turn over

Section B (Paragraph/Probem Type)

Answer at least **five** *questions.*
Each question carries 5 *marks.*
All questions can be attended.
Overall Ceiling 25.

13. Explain constructive and destructive interference using Young's experiment.

14. Explain the theory of population inversion. What is the significance of metastable state in lasing action ?

15. Describe a quarter wave plate and a half wave plate.

16. Distinguish between positive and negative crystals.

17. With a neat diagram, explain the working of a full wave bridge rectifier.

18. Light of wavelength 500 nm is incident normally on a plane transmission grating. A second order spectral line is observed at an angle of 30°. Calculate the number of lines per meter on the grating surface.

19. A transistor is connected in common emitter (CE) configuration in which collector supply is 8 V and voltage drop across resistance $R_C = 800\Omega$ connected in the collector circuit is 0.5 V and $\alpha = 0.96$. Determine the collector-emitter voltage and base current.

$(5 \times 5 = 25$ marks$)$

Section C (Essay Type)

Answer any **one** *question.*
The question carries 11 *marks.*

20. Explain the construction and working of a) Ruby laser ; and b) He-Ne laser.

21. Describe principle and working of any oscillator with neat diagram and explain how it produces sustained oscillation. Derive the necessary formula.

$(1 \times 11 = 11$ marks$)$