E 8164 (Pages : 2) Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2019

Fifth Semester

Core Course—PHYSICAL OPTICS AND PHOTONICS

(Common for Model–I and Model–II B.Sc. Physics, B.Sc. Physics Instrumentation and B.Sc. Physics EEM)

[2013 to 2016 Admissions]

Time : Three Hours Maximum Marks : 60

Part A

Answer **all** *questions briefly.*

Each question carries 1 *mark.*

1. State the superposition principle.
2. What is meant by coherent beam of light?
3. Write down the condition for constructive interference of two beams of light.
4. What do half period zones mean?
5. State Brewster's law.
6. What are Einstein coefficients?
7. What is single mode fibre?
8. Explain the principle of optical fibre.

(8 × 1 = 8)

Part B

Answer any **six** *questions.*

Each question carries 2 *marks.*

9. How can two coherent sources be produced?
10. How colours are seen on a film of oil spread on water?
11. State the purpose of compensating plate in Michelson interferometer.
12. Give the differences between grating and prism spectra.
13. Why there is more than one focus on a zone plate?
14. Is it possible to detect circularly polarized light from unpolarised light?
15. What is the reason for the monochromaticity of laser beam?

Turn over

16. State the relevance of population inversion in lasers.

17. Differentiate between SI and GI fibers.

18. What are the advantages of fiber optics communication systems?

(6 × 2 = 12)

Part C

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

19. The diameter of the central zone of a zone plate is 2.3 mm. If a point light source of wave length 590 nm is placed at a distance of 6 m from it, find the position of the brightest image.

20. Find the highest order of spectrum of sodium light of wavelength that can be observed using a grating with 6×10^5 lines/m?

21. Determine the polarizing angle on the surface of water with refractive index 1.33.

22. Briefly discuss on the functions of resonance cavity.

23. The critical angle of refraction for the core-cladding interface of an optical fiber is 70. If the refractive index of the core is 1.5 calculate the numerical aperture.

24. Give a vivid picture of a three level pumping scheme with diagrams.

(4 × 4 = 16)

Part D

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

25. Describe how Michelson achieved standardization of metre.

26. Give the theory of Fraunhoffer diffraction on a double slit. Explain the phenomenon of missing orders.

27. What is meant by double refraction? Explain how can you make a quarter and half wave plate from a uniaxial doubly refracting crystal.

28. Describe how hologram is generated and image is reconstructed using off-axis configuration.

(2 × 12 = 24)