

72402

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Name.....

Reg. No.....

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

(UG-CCSS)

Complementary Course—Physics

PH 3C 05—OPTICS, LASER, ELECTRONICS AND COMMUNICATION

(2009–2012 Admissions)

Time : Three Hours

Maximum : 30 Weightage

Part A

Answer all questions.

Each question carries $\frac{1}{4}$ weightage.

1. No real light source emits _____ electromagnetic waves.
2. Coherent waves are _____.
3. For constructive interference to take place between two monochromatic light waves of wavelength λ the path difference should be _____.
4. To observe diffraction, the size of obstacle must be _____.
5. A diffraction pattern is obtained using a beam of red light. What happens if the Red light is replaced by blue light :
 - (a) No change.
 - (b) Diffraction bands become narrower and crowded together.
 - (c) Bands become broader and farther apart.
 - (d) Bands disappear.
6. Diffraction fringes are _____ width.
7. Optically active substance are those which _____.
8. A laser is a _____ source.
9. A Zener diode has a _____ in the breakdown region.
10. Voltage divider bias operates in the :
 - (a) Active region.
 - (b) Cut-off region.
 - (c) Saturation region.
 - (d) Breakdown region.
11. An AND gate is equivalent to a _____.
12. A Colpitts oscillator uses :
 - (a) Tapped coil.
 - (b) Inductive feedback.
 - (c) Tapped capacitance.
 - (d) No tuned LC circuit.

(12 \times $\frac{1}{4}$ = 3 weightage)

Turn over

Part B

*Answer all questions.
Each question carries 1 weightage.*

13. Give two comparisons of Newton and Galilean telescopes.
14. How can Coherent sources be obtained in practice ?
15. Why is a soap bubble or thin film of oil spread over the surface of water appear coloured in sunlight ?
16. Explain the phenomenon of diffraction.
17. Explain why a grating is designed to produce only two orders.
18. Distinguish between polarized and unpolarized light.
19. What is Population Inversion ?
20. Draw the circuit of a full wave rectifier.
21. What is an optical fiber ? How does it work ?

(9 × 1 = 9 weightage)

Part C

*Answer any five questions.
Each question carries 2 weightage.*

22. State and explain Fermat's principle of extremum path. Give an example where the path of light is a relative maximum.
23. What is a biprism ? In a biprism experiment the edge piece is placed at a distance of 1.2 m. from the source. The distance between the virtual sources is 7.5×10^{-4} m. Find the wavelength of light if the eyepiece is moved transversely through a distance of 1.888 cm. for 20 fringes.
24. What are Fresnel half period zones ? What is the radius of the first half period zone in a zone plate behaving like a convex lens of focal length 0.6 m. for light of wavelength 6000 Å.
25. Give the construction and working of a Nicol Prism. How is it used as an analyzer ?
26. Explain the working of a Huygen's eyepiece. Why is it called a negative eyepiece ?
27. Explain the principle and working of a He-Ne laser.
28. Explain the working of a Hartley oscillator.

(5 × 2 = 10 weightage)

Part D

*Answer any two questions.
Each question carries 4 weightage.*

29. What are Newton's rings ? How would you obtain Newton's rings with bright center ? Describe an experiment to determine the wavelength of sodium light using Newton's rings.
30. What is a plane diffraction grating. Describe with theory how the wavelength of light is determined using a grating.
31. Explain the construction and working of a CE amplifier. Draw the frequency response. What is bandwidth ? What are the merits of negative feedback ?