16U315 (Pages:2) Name: …….

Reg. No…….……..

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2017

(Regular/Supplementary/Improvement)

(CUCBCSS-UG)

CC15UPH3C05- OPTICS, LASER, ELECTRONICS & COMMUNICATION

(Physics - Complementary Course)

(2015 Admission onwards)

Time: Three Hours Maximum: 64 Marks

Section A

Answer ***all*** questions. Each question carries one mark

1. If two coherent sources of intensity ratio 100:1interfere, then ratio of the intensity between maxima and minima in the pattern is…….
2. When the distance between the coherent sources is increased the band width ……. .
3. When liquid is replaced by air between the lens and glass plate of a Newton's ring apparatus the diameter of the rings ……. .
4. If the light is completely polarized by reflection at a plane refracting surface then the angle between reflected and refracted rays is …….. .
5. The path difference produced between ordinary and extraordinary ray in a half wave plate is ……
6. The common collector transistor configuration is generally used for …… .
7. In television transmission, which modulation is used for sound signal?
8. A zener diode is always ……. biased.
9. The central portion of the optical fibre is called …….. .
10. In a semiconductor laser device the …….. plays the role of ground level.

(10 x1 =10marks)

Section B

Answer ***all*** questions. Each question carries two marks

11. Light ray travels a distance of 15 cm through a medium of refractive index 1.33. Find the optical path?
12. What are the minimum conditions for producing an interference pattern?
13. Define resolving power. Write the formula for resolving power of a grating and explain the symbols.
14. Define efficiency and ripple factor of a rectifier.
15. Draw a labeled diagram of a ruby laser.
16. What is meant by demodulation?
17. Draw the circuit and logical symbol of a NOT gate.

(7x2 = 14marks)

Section C

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

18. Explain the rectilinear propagation of light using Fermat's principle.
19. Explain the phenomenon of colours of thin films.
20. Draw a labeled circuit diagram to find the characteristics of CE configuration.
21. State the De Morgan's theorem. Using it show that $(A+E)(\bar{A}+\bar{E})=A\bar{E}+\bar{E}A$
22. Differentiate between step index and graded index fibre's.

(3 x 4 =12 marks)

Section D

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

23. Parallel light of wavelength $6500A^0$ is incident normally on a slit 0.4mm wide.A lens with focal lengthof 50cm located just behind the slit brings the diffraction pattern to focus on a screen. Find the distance from the centre of the principal maximum to i) the first minimum and ii)fifth minimum.
24. When a liquid is introduced between the lens and the plate in a Newton's ring arrangement, the diameter of the 10^{th} dark ring changes from 0.30cm to 0.25 cm. Calculate the refractive index of the liquid.
25. Calculate the phase retardation for wavelength 500nm when the plate thickness is 0.03mm. Given
    μ_o =1.5418 and μ_e =1.5508 for quartz crystal.
26. A step index fibre has a core of refractive index 1.55. If the signal is launched from air and the numerical aperture is 0.248, find the refractive index of cladding. Also find the acceptance angle.
27. A transistor has a current amplification factor of 50. In a CE amplifier, the collector resistance is chosen as 5 kΩ and the input resistance is 1 kΩ. Calculate the output voltage if input voltage is 0.01 V.

(3 x 4=12marks)

Section E

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

28. What is a plane transmission grating? Discuss the theory of plane transmission grating and deduce the grating law.
29. Describe an experiment to determine the wavelength of monochromatic light using Fresnel's biprism.
30. Describe the principle and working of a full wave bridge rectifier. Derive an expression for the efficiency of full wave rectifier.
31. Explain the principle, construction and working of a four stage laser.

(2x 8=16 marks)

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