15U311 (Pages: 2) Name: .....

Reg. No.....

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016

(CUCBCSS - UG)

Physics - Complementary Course

CC15U PH3 C05- OPTICS, LASER, ELECTRONICS & COMMUNICATION

(2015 Admission)

Time : Three Hours Maximum : 64 Marks

Section A (Answer all questions) (Each carries one mark)

1. If N coherent waves, each of intensities I, are superposed at a point, then resultant maximum intensity at the point will be ----------.
2. When an illuminated wedge is observed the fringe at the apex is ----------.
3. The grating spectrum is caused by ----------.
4. The expression for the area of half period zone is ----------.
5. The phenomenon which proved the transverse nature of light waves is ----------.
6. Which is the most heavily doped region in a transistor?
7. A negative feedback amplifier improves the ----------.
8. ---------- laser can emit light of wavelength, UV to IR range.
9. In television transmission, ---------- modulation is not used.
10. The universal gate is ----------. (10 x 1 =10 marks)

Section B (Answer all questions) (Each carries two marks)

11. Explain optical path of a light ray.
12. State and explain superposition principle.
13. Distinguish between negative and positive crystals.
14. Define the three current amplification factors. Write the relation between them.
15. Using a suitable figure, discuss the phenomenon of stimulated emission.
16. What is amplitude modulation?
17. Draw the circuit diagram of a Zener diode voltage regulator.

(7 x 2 =14 marks)

Section C (Answer any three questions) (Each carries four marks)

18. Using Fermat's principle, prove the laws of refraction.
19. Distinguish between Fresnel's and Fraunhoffer's class of diffraction.
20. What are filter circuits? Explain capacitor filter and π-filter.
21. Draw the circuit and logical symbol of a NOR gate. Also write the truth table for NOR gate.
22. Derive an expression for acceptance angle in an optical fiber.

(3 x 4 =12 marks)

Section D (Answer any three questions) (Each carries four marks)

23. In Fresnel's bi-prism experiment, the width of fringes obtained with light of wavelength 600nm is 2 mm. What will be the fringe width, if the entire apparatus is immersed in water of refractive index 1.33?
24. A Newton's ring apparatus is used with a source emitting two wave lengths λ_1 and λ_2 .It is found that the n^{th} dark ring due to λ_1 coincides with the $(n+1)^{th}$ dark ring due to λ_2.If radius of curvature of the lens is Rfind radius of the nth ring.
25. Calculate the maximum possible order of spectra with a plane transmission grating having 3200 lines per cm when light of wavelength $4500A^0$is used?
26. In a Hartley transistor oscillator the inductors used are 100 pH and 1000 pH. If the mutual inductance between the coils is 20H and capacitance is20 pF. Calculate the frequency of the oscillator.
27. A light ray from air enters a step index fiber having core of ref index 1.55 and clad of ref index 1.5. Determine the numerical aperture and acceptance angle of the fiber.

(3 x 4 =12marks)

Section E (Answer any two questions) (Each carries eight marks)

28. Describe, what you mean by a plane, circularly and elliptically polarized light? Discuss briefly how circularly and elliptically polarized light can be produced and detected?
29. What are Newton's rings? Derive expressions for the radii of dark and bright rings.
30. Describe the working of a full wave rectifier. Show that its rectification efficiency is twice that of a half wave rectifier.
31. Describe the principle, construction and working of any solid Laser

(2x 8 =16 marks)

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