D 72402-A (Pages : 3) Name

Reg. No. . . . . .

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

(UG.—CCSS)

Complementary Course—Physics

PH 3C 05—OPTICS LASER, ELECTRONICS AND COMMUNICATION

(2013 Admissions)

Time : Three Hours Maximum : 30 Weightage

Section A

Answer **all** *questions.*
Each carries $^1/_4$ ***weightage.***

1. (i) Finger prints of a piece of paper may be detected by sprinkling fluorescent power on the paper and then looking into it under

(a) Yellow light (b) Brightness.

(c) Infrared light. (d) Ultraviolet light.

(ii) Colours of thin film is due to the phenomenon of ————

(iii) A grating has 5000 lines/cm. The maximum order visible with wavelength 6000 A

(a) 2. (b) 3.

(c) 4. (d) 0.

(iv, Which of the following has the longest wavelength ?

(a) Blue light. (b) Gamma ray.

(c) X—Ray. (d) Red light.

2. (i) A point source emits ligh equally in all direction. Two point P and Q are at distances 9 m and 25 m respectively from the source. The ratio of the amplitudes of the waves P and Q is :

(a) 9 : 25. (b) 25 : 9.

(c) 92 : 252 (d) 252 : 92.

(ii) A Nicol prism is based on the action of :

(a) Refraction. (b) Double refraction.

(c) Dichroism. (d) Both (b) and (c).

(iii) An optically active substance :

(a) Produce polarized light.

(b) Rotates the plane of polarization of polarized light.

(c) Converts plane polarized light into circularly polarized light.

(d) None of the above.

(iv) In an *npn* transistor circuit, the collector current is 10 **mA .** If 90% of the electrons emitted reach the collector :

(a) The emitter current will be 9 **mA**

(b) The emitter current will be 11 **mA.**

(c) The base current will be 10 **mA.**

(d) The base current will be 0.1 **mA.**

3. (i) For a transistor the value of a = 0.9, the value of β = _____

(ii) An oscillator is basically an amplifier with gain :

(a) Less than unity. (b) More than unity.

(c) Zero. (d) 0.5.

(iii) The modulation index of an AM wave is changed from 0 to 1 The transmitted power is :

(a) Unchanged (b) Halved.

(c) Doubled. (d) Increased by 50 percent.

(iv) Which of the following is used for digital communication ?

(a) FM. (b) AM.

(c) PAM. (d) **PCM.**

(12 x ¼ = 3 **weightage)**

Section B

Answer **all** *nine questions.*
Each question carries a ***weightage*** *of* 1.

4. What is Fermat's principle ?
5. What is superposition principle ?
6. Write down the condition for brightness and darkness.
7. What is dispersive power ?
8. What is polarization ?
9. What is a **zener** diode ?
10. Explain population inversion. How it is achieved ?
11. What is modulation ?
12. What is **Demorgan's** theorem ?

(9 x 1 = 9 **weightage)**

Section C

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

13. Discuss the laws of reflection and refraction.
14. Explain colours of thin film.
15. Distinguish between **Fresnel** diffraction and **Fraunhofer** diffraction.

16. State and explain Brewster's law.

17. Give a short account of He-Ne laser.

18. Obtain an expression for the total energy carried by amplitude modulated wave.

19. An optical fiber has a core of refractive index 1.52 and cladding of refractive index 1.42, calculate NA and acceptance angle.

(5 x 2 = 10 weightage)

Section D

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

20. Explain the formation of spectra by a plane diffraction grating. What are its chief characteristics ?

21. Describe the method of producing linearly, circularly and elliptically polarized light.

22. Describe principle and working of any oscillator and explain how it produce sustained oscillation. Derive the necessary formula.

(2 x 4 = 8 weightage)