5214 – D71 – IVSS – M – 14

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, MAY 2014

(New Syllabus)

PHYSICS

Time : 3 Hours]

[Max. Marks :

Answers to questions from 1 to 4 should be written in the first page of answer book.

Part I – (Marks : 10 × 2 = 20)

Answer any ten of the following. Each question carries 2 marks.

1. When light wave suffers reflection at a interface between air and glass, the change of phase of th reflected wave is

   (a) 0   (b) $\pi/2$ (c) π (d) 2π

2. The correct formula for Resolving Power of grating is.

   (a) $N \times n$ (b) n^2/N (c) $\dfrac{n}{N}$ (d) $(N \times n)^2$

3. A quarter wave plate produces a path difference of .... between O-ray and E-ray.

   (a) $\dfrac{\lambda}{2}$ (b) $\dfrac{\lambda}{4}$ (c) λ (d) 4λ

4. Thomson effect is zero in case of

   (a) Iron   (b) Copper   (c) bismuth   (d) lead

5. What are coherent sources?

6. Write any two differences between Fresnel's and Fraunhoffer's diffraction of light.

7. Define dispersive power of grating.

8. What is seeback effect?

9. State Stokes theorem.

10. When the movable mirror of Michelson interferometer is shifted by 3×10^{-5} m, the shift of 100 fringes observed. Calculate the wavelength of the light used.

11. Find the radius of the first zone in a zone plate of focal length 0.4m for a light of wavelength 400×10^{-9} m.

12. Calculate the Peltier co-efficient of hot junction at 373 K of a thermocouple having thermoelectric power 5μV/K.

[P.T.O.

Part II (Marks : 6 × 5 = 30)

Answer any ten questions. Each question carries 6 marks.

13. Obtain an expression for the thickness of a thin glassplate using biprism experiment.

14. Describe Fraunhoffer diffraction at single slit.

15. Derive an expression for the resolving power of a prism.

16. State and explain Malus law in polarization.

17. Prove that divergence of curl of a vector field is zero.

18. In a biprism experiment, fringes are produced in the focal plane of the eye piece at a distance 1m. from the slit. A lens inserted between the biprism and the eye piece produces two images of the slit 4.05mm apart in one position of the lens and 2.9mm apart in another. If wavelength of the sodium light is 5893° A, Find the fringe width.

19. Light of wavelength 500nm. is incident on a plane diffraction grating. A second order spectral line is obtained at an angle of 30°. Calculate the number of lines per meter of grating surface.

20. The values of "a" and "b" are 16.65µV/° C and – 0.096µV/° C² for iron-lead thermocouple, 2.85 µV and 0.17 µV/° C² for silver-lead thermocouple. Calculate the neutral temperature for iron-silver thermocouple.

Part III – (Marks : 3 × 10 = 30)

Answer the following questions. Each question carries 10 marks.

21. Describe the construction and working of Michelson interferometer with neat diagram and mention its uses.

Or

What are Newtons rings? Obtain the expressions for diameter of nth bright and dark fringe.

22. Derive the expression for the resultant amplitude of the composition of "n" number of SHM's of the same amplitude and period having their phases increasing in arithmatic progression.

Or

Explain the production and detection of circularly polarized light.

23. What is Peltier effect? Explain thermodynamics of Peltier effect and show how it leads to discovery of Thomson effect.

Or

Derive the following Maxwell's equations.

(i) $Curl\ \vec{H} = \vec{J} + \dfrac{\partial \vec{D}}{\partial t}$

(ii) $div\ \vec{D} = \rho$