(b)

Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 3001

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS –DECEMBER 2019
First Semester
Computer Science and Engineering
U15PH101 – PHYSICS – I
(Common to Electrical and Electronics Engineering, Electronics and Communication Engineering, Information Technology & Biotechnology)
(Regulation 2015)

Time : Three Hours Maximum : 100 Marks

Answer ALL the questions

PART – A

(10 x 2 = 20 Marks)

1. What is total internal reflection of light? State the criterion for total internal reflection.
2. State the principle of superposition of waves.
3. What is diffraction of light? Compare the diffraction of violet & red rays.
4. Calculate the radii of the first two dark rings of the Fraunhofer diffraction pattern produced by a circular aperture of radius 0.02 cm at the focal plane of a convex lens of focal length 20 cm. Assume $\lambda = 6 \times 10^{-5}$ cm.
5. Define laminar and turbulent flow of a liquid.
6. State Bernoulli's principle in fluid dynamics.
7. Define heat convection current. Distinguish between natural and forced convection.
8. What is black body radiation?
9. Sketch within a cubic unit cell the following planes.
   (a) $(10\bar{1})$ (b) $(2\bar{1}1)$
10. Show that the atomic packing factor for the FCC crystal structure is 0.74.

PART – B

(5 x 16 = 80 Marks)

11. a) Discuss in detail the application of the thin film interference phenomenon in reducing the reflectivity of lens surface.

(OR)

b) In Michelson's interferometer experiment, calculate various values of θ' (corresponding to bright rings) for $d = 5 \times 10^{-3}$cm. Show that if d is decreased to 4.997×10^{-3} cm, the fringe corresponding to m = 200 disappears. What will be the corresponding value of θ? Assume $\lambda = 5\times10^{-5}$cm.

12. a) Prove that the resolving power of a grating depends on the total number of lines in the grating.

(OR)

b) Consider a non-reflecting film of refractive index 1.38. Assume that its thickness is 9×10^{-6}cm. Calculate the wavelengths of Blue, Green and Red (in the visible region) for which the film will be non-reflecting. Repeat the calculations for the thickness of the film to be 45×10^{-6}cm. Show that both films will be non-reflecting for a particular wavelength, but only the former one will be suitable. Why?

13. a) Explain unidirectional flow using Couette-Poiseuille equation.

(OR)

b) State and prove Torricelli's theorem.

14. a) Derive an expression to determine the thermal conductivity of a bad conductor (in the form of flat disc) using Lee's Disc method.

(OR)

b) A solid cylinder Copper rod of 0.10m long has one end maintained at a constant temperature of 20K. The other end is blackened and exposed to the thermal radiation from a body at 300K, with no energy lost or gained through the sides of the cylinder. When equilibrium is reached, what is the temperature difference between the two ends?

15. a) Differentiate between Schottky and Frenkel defects. Illustrate with example. Explain why crystalline solids are more defective as a result of increasing temperature?

(OR)

b) What is the difference between atomic structure and crystal structure? Show for the body centered cubic crystal structure that the unit cell edge length a and the atomic radius R, are related through $a = {}^{4R}/_{\sqrt{3}}$ and atomic packing factor for BCC is 0.68.
