

Dec 2019 to Feb/May 2020  
Sem I, III to I, III sem.

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: 3003

E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DECEMBER 2019

First Semester

Biotechnology

U19PH102 – PHYSICS FOR BIOTECHNOLOGY

(Regulation 2019)

Time : Three Hours

Maximum : 100 Marks

Answer ALL the questions

PART – A

(10 x 2 = 20 Marks)

1. Explain the principle used in optical fiber for communication.
2. How the wavelength of a monochromatic light can be calculated using interference of light.
3. How the grating spectra is different from the prism spectra?
4. Explain Malus Law with proper diagram.
5. Draw the following lattice planes in a simple cubic lattice: (011), (002), (111) and (112).
6. Calculate the coordination number and packing factor of a simple cubic lattice.
7. Why nano materials exhibit higher surface to volume ratio?
8. Why the electronic properties of carbon nanotubes are highly dependent on their edge geometry?
9. Write any two applications of X-ray diffraction.
10. How the operating voltage affects the resolution of SEM?

PART – B

(5 x 16 = 80 Marks)

11. a) Discuss the construction and working of Michelson interferometer. How it can be used to determine the wavelength of He-Ne laser? (10+6)

(OR)

- b) Why the lenses of good quality camera are coated with a thin film? A soap bubble film is illuminated in free space by a light of wavelength =  $7200 \text{ \AA}$ . If the refractive index of film is 1.4, calculate the minimum film thickness for constructive interference. (8+8)
12. a) Using proper diagram, discuss Young's double slit experiment and derive the expressions for position of  $n^{\text{th}}$  dark fringes, bright fringes and fringe width. (OR)
- b) Explain the propagation of electromagnetic waves in free space and show that electric field vector (E) is perpendicular to magnetic field vector (B).
13. a) i. Find the atomic planar density of (111) plane for a cubic BCC lattice with bond length  $1.73 \text{ \AA}$ . (8)  
ii. There are  $3.6 \times 10^{10}$  lattice points in an ionic crystal and the energy of vacancy formation is 1 eV. Calculate number of Schottky defects in the crystal at 1000 K. (8)
- (OR)
- b) Write the characteristics of seven crystal systems. Also write possible number of lattice types in each system.
14. a) Why the properties of nano materials are different than those of bulk materials? Explain the ballistic transport and quantum confinement effects. (8+4+4)
- (OR)
- b) How carbon nanotubes are obtained via laser ablation method? Give the classification of carbon nanotubes based on their chirality vectors with example. (8+8)
15. a) Discuss the working principle (with diagram) and applications of Raman spectroscopy. (OR)
- b) Why electron source is used for characterization of surfaces of nano materials? What makes TEM so accurate?