Code No: R19BS1204 **R19** SET - 1

I B. Tech II Semester Supplementary Examinations, March - 2022
APPLIED PHYSICS
(Com. to EEE, ECE, CSE, EIE, IT)

Time: 3 hours Max. Marks: 75

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

Unit I

1. a) Explain why Newton's rings are circular. Also, explain why the center of Newton's rings is dark in the reflected system. (8M)

   b) The diameter of the 10^{th} dark ring in Newton's rings system, which is viewed normally by the reflected light of wavelength 400nm, is 4mm. Calculate (a) the the radius of curvature of the plano-convex lens and (b) the thickness of air film atthe10^{th} dark ring. (3M)

   c) Discuss any one of the applications of Newton's rings. (4M)

Or

2. a) What is resolving power? Derive an expression for resolving power of a grating. (8M)

   b) What is the highest order of spectrum which may be observed with monochromatic light of wavelength 5000 Å using a grating with 5000 lines/cm? (3M)

   c) Distinguish between phenomena of interference and diffraction. (4M)

Unit II

3. a) Explain the physical significance of wave function and obtain Schrodinger's time-independent wave equation. (10M)

   b) State the Heisenberg's uncertainty principle. Discuss its importance. (5M)

Or

4. a) Elucidate de Broglie's concept of matter waves and using the analogy of electromagnetic radiation obtain the expression for de Broglie wavelength in terms of momentum and accelerating potential. (8M)

   b) A beam of 54eV electrons is directed at a nickel target. The potential energy of an electron that enters the target changes by 25eV. (7M)
   (i) Compare electron speeds outside and inside the target
   (ii) Compare respective de-Broglie wavelengths.

Unit III

5. a) Write a short note on (10M)
   (i) effective mass of an electron
   (ii) effective mass of a hole

   b) Explain the qualitative Bloch's function. (5M)

Or

6. a) Obtain an expression for Fermi energy using the energy density of states. Write its significance. (8M)

   b) Calculate the Fermi energy of copper at 0 K if the concentration of the electron is 8.5×10^{28} m^{-3}. (7M)

Unit IV

7. a) Explain Drift and diffusion processes in semiconductors. Relate the diffusion coefficients and motilities of charge carriers of the two processes. (10M)

   b) Find the diffusion coefficient of electrons in Silicon at 300 *K* if μ_e is 0.19 $m^2/V\text{-}s$. Given that Boltzmann constant=1.38 x 10^{-23}J/K. (5M)

Or

8. a) Obtain an expression for carrier concentration in an intrinsic semiconductor. (10M)

   b) Calculate the intrinsic concentration of charge carriers at 300K given that $m^*_e = 0.12m_o$,$m^*_h = 0.28m_o$ and the value of brand gap = 0.67 eV. (5M)

Unit V

9. a) What is meant by the internal field? Obtain an expression for the internal field using the Lorentz method. (8M)

   b) What do you mean by orientational polarization? Discuss the temperature dependence of orientational polarization. (7M)

Or

10. a) Discuss the properties of Dia, para, and ferromagnetic materials. (8M)

    b) Explain the B-H curve of ferromagnetic material based on domain theory. (7M)