Instructions to the candidates:

Draw neat diagrams wherever necessary. Figures to the right indicate full marks.

PART A

Answer ALL the questions: (10 x 2 =20)

1. Calculate the threshold frequency of a metal having a work function of 2.5 eV
2. Draw a graph that relates de Broglie wavelength and the linear momentum of a particle
3. An electron and a proton are accelerated through same potential. Obtain the ratio of de-Broglie wavelength of λ_e/λ_p
4. State the importance of de Broglie wavelength
5. Explain how Einstein breakthrough the classical physics to explain photo electric effect
6. Define Poynting vector
7. Consider a Gaussian surface surrounds a point charge q. what do you understand if the net flux through a Gaussian surface is zero
8. Explain how Faraday's experimental proved the existence of electromagnetic induction
9. State Ampere's circuital law
10. Define meaning of Gauss law for magnetism in Maxwell's equation ($\nabla.B=0$).

Answer ANY THREE questions.

11. Obtain Schrödinger time dependent and independent equation.

12. (A) Write generalised Maxwell's equations in differential and integral form and indicate their significance. (5)

(B) When a 180 nm light is used in an experiment with an unknown metal, the measured photocurrent drops to zero at potential -0.80 V. Determine the work function of the metal and its cut-off frequency for the photoelectric effect (5)

13. (A) If the position of a 5 KeV electron is located within 2 Å, what is the percentage of uncertainty in its momentum? (4)

(B) Discuss the importance of displacement current and explain how Ampere's law is modified to explain time varying fields. (6)

14. Deduce the Maxwell's equations for the propagation of electromagnetic wave in non-conducting to obtain an expression for velocity.