** Darbhanga College of Engineering**

**(**Established under AICET Act,)

**Department of Physics**

**221101 Engineering Physics**

**TUTORIAL SHEET**

1. Calculate the de Broglie wavelength for

(a) a proton of kinetic energy 70 MeV and

(b) a 100 g bullet moving at 900 ms-1.

1. Estimate the uncertainty in the position of (a) a neutron moving at 5 X 106 ms-1 and (b) a 50 kg person moving at 2 ms-1.
2. A 45 kW broadcasting antenna emits radio waves at a frequency of 4 MHz.

(a) How many photons are emitted per second?

(b) Is the quantum nature of the electromagnetic radiation improtant in analyzing the radiation emitted from this antenna?

1. When light of a given wavelength is incident on a metallic surface, the stopping potential for the photoelectrons is 3.2 V. If a second light source whose wavelength is double that of the first is used, the stopping potential drops to 0.8 V. From these data, calculate

(a) the wavelength of the first radiation and

(b) the work function and the cutoff frequency of the metal.