AS Level Physics A

H156/02 Depth in physics

Question Set 13

1 (a)* In an experiment to investigate microwaves, a microwave detector **D** is placed between a microwave transmitter **T** and a flat metal sheet.

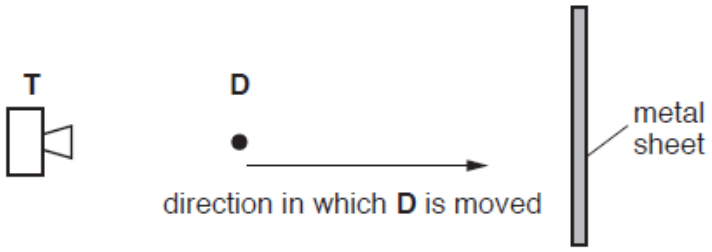

Fig. 7.1

The detected signal at **D** shows regions of maximum and minimum intensity as **D** is moved towards the metal sheet as shown in Fig. 7.1. The distance between **adjacent** regions of maximum and minimum intensities is 72 mm.

Explain the presence of the regions of maximum and minimum intensity **and** determine the frequency of the microwaves.

The speed of microwaves in air is $3.0 \times 10^{8}\,m\,s^{-1}$.

[6]

(b) In another experiment using microwaves, a metal grille **G** consisting of a series of long metal rods is placed between the transmitter **T** and the detector **D** as shown in Fig. 7.2.

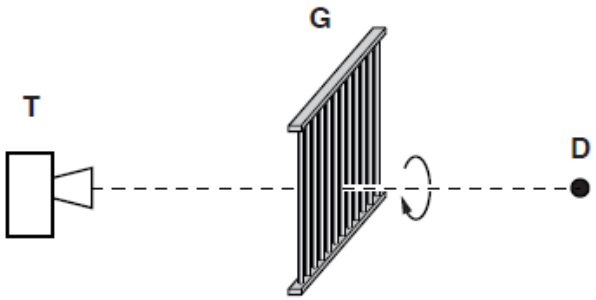

Fig. 7.2

The grille is slowly rotated through 180° about the line joining **T** and **D**. The detected signal at **D** varies from zero to maximum and back to zero again.

Explain why the detected signal behaves in this way.

[2]

Total Marks for Question Set 13: 8