3 Fig. 3.1 shows a transmitter T on a building, which emits radio waves of wavelength 2.0×10^3 m. The radio waves from transmitter T travel to a receiver R by two paths as shown in Fig. 3.1 (not to scale).

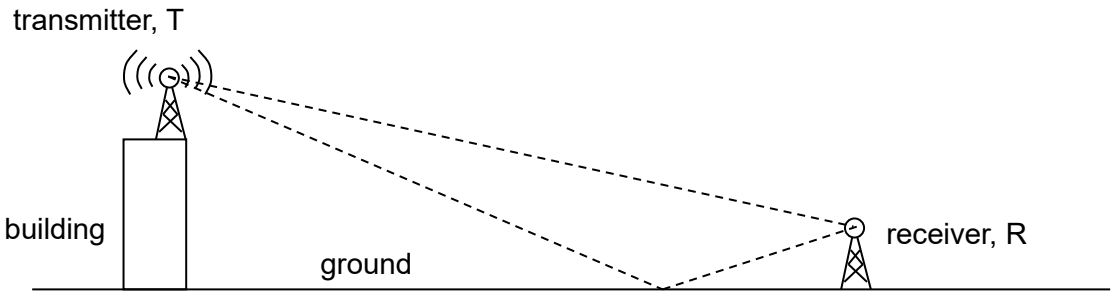

Fig. 3.1

For the first path, the wave travels 2.4×10^4 m directly from T to R. For the second path, the wave travels to the ground and is reflected to R. Maximum intensity is received at R. It is assumed that there is no change in phase of the radio wave upon reflection at the ground.

(a) (i) State what is meant by *interference*.

……..……..

……..……..

……..…..… [2]

(ii) State two conditions necessary to obtain a well-defined interference pattern.

……..……..

……..……..

……..…..… [2]

(iii) Explain why maximum intensity is received at R.

……..……..

……..……..

……..…..… [2]

(b) Calculate the minimum distance travelled by the radio wave in the second path (reflected path), which will produce maximum intensity at R.

minimum distance = ... m [2]

(c) In order to receive radio waves, an antenna must be used at R.

(i) Calculate the frequency of the radio waves received at R.

frequency = ... Hz [1]

(ii) The antenna is configured to resonate at a particular frequency. Suggest a reason why the phenomenon of resonance is used in receiving radio wave.

……..……..

……..……..……[1]

[Total: 10]