

Q1.(a) Describe what is meant by amplitude modulation (am).

.....
.....
.....

(1)

(b) A radio wave has an unmodulated frequency of 120 kHz. It is amplitude modulated by a signal from an audio transducer of frequency 2.2 kHz.

Calculate the bandwidth of the modulated wave.

bandwidth = kHz

(1)

(c) Explain why frequency modulation (fm) is not used for commercial radio transmissions in the medium and long wave bands.

.....
.....

(1)

(d) State and explain **one** advantage of transmitting digital signals using frequency modulation (fm) rather than amplitude modulation (am).

.....
.....
.....
.....

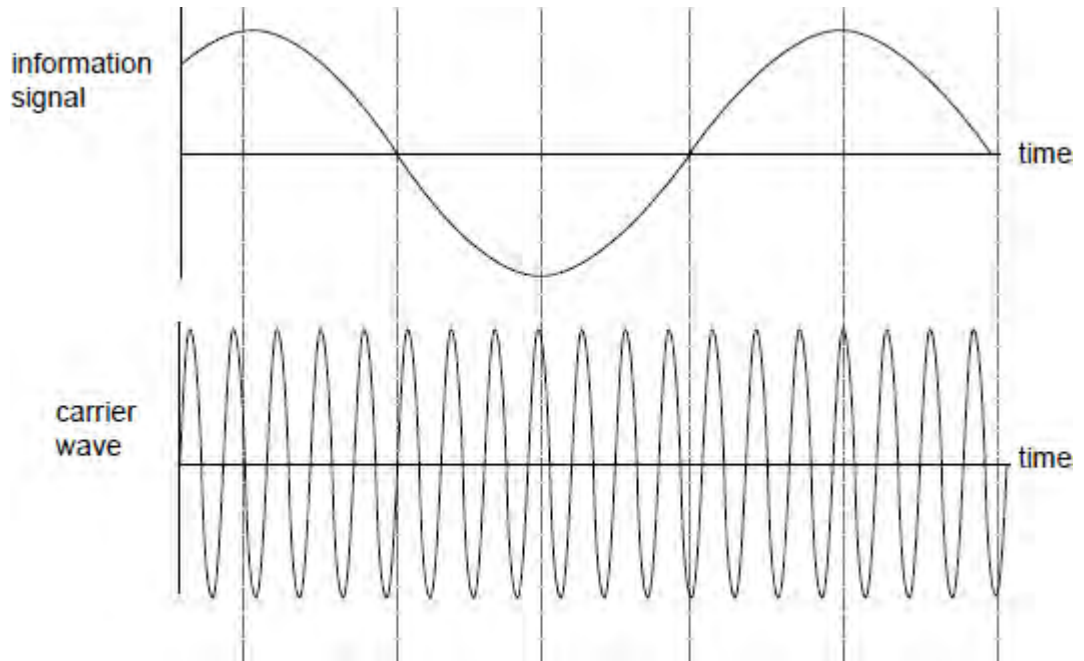
(2)

(Total 5 marks)

Q2.(a) An information signal and a carrier wave are shown on the axes below.
Show how these can be combined to form

(i) an AM signal

(ii) an FM signal.



(i) AM signal



(3)

(ii) FM signal



(3)

(b) The information signal has a maximum frequency of 3 kHz.

(i) Calculate the bandwidth of the resulting AM signal.

.....

(1)

(ii) The maximum frequency deviation of the FM carrier is ± 5 kHz. Calculate the practical bandwidth of the resulting FM signal.

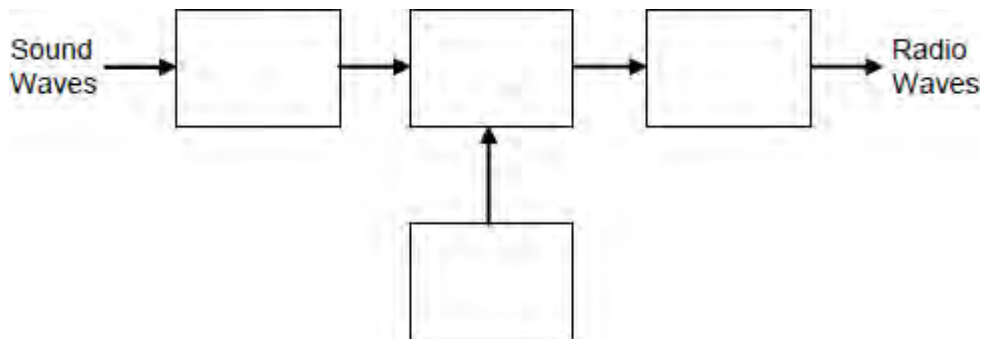
.....

(2)

(Total 9 marks)

Q3.(a) A radio transmitter system consists of the four subsystems.

Label the diagram below with the names of each subsystem.



(4)

(b) (i) Which **one** of the subsystems above produces an unmodulated rf signal and may contain a tuned circuit?

.....

(1)

- (ii) The tuned circuit contains a 5 pF capacitor and a 0.1 μ H inductor. Calculate the frequency of the signal that the subsystem produces.

.....

.....

.....

(3)

- (c) A DAB transmitter has a frequency of 227.36 MHz. Calculate the length of a half-wave dipole that would be suitable for use as an aerial for this transmitter.

.....

.....

.....

(2)

(Total 10 marks)